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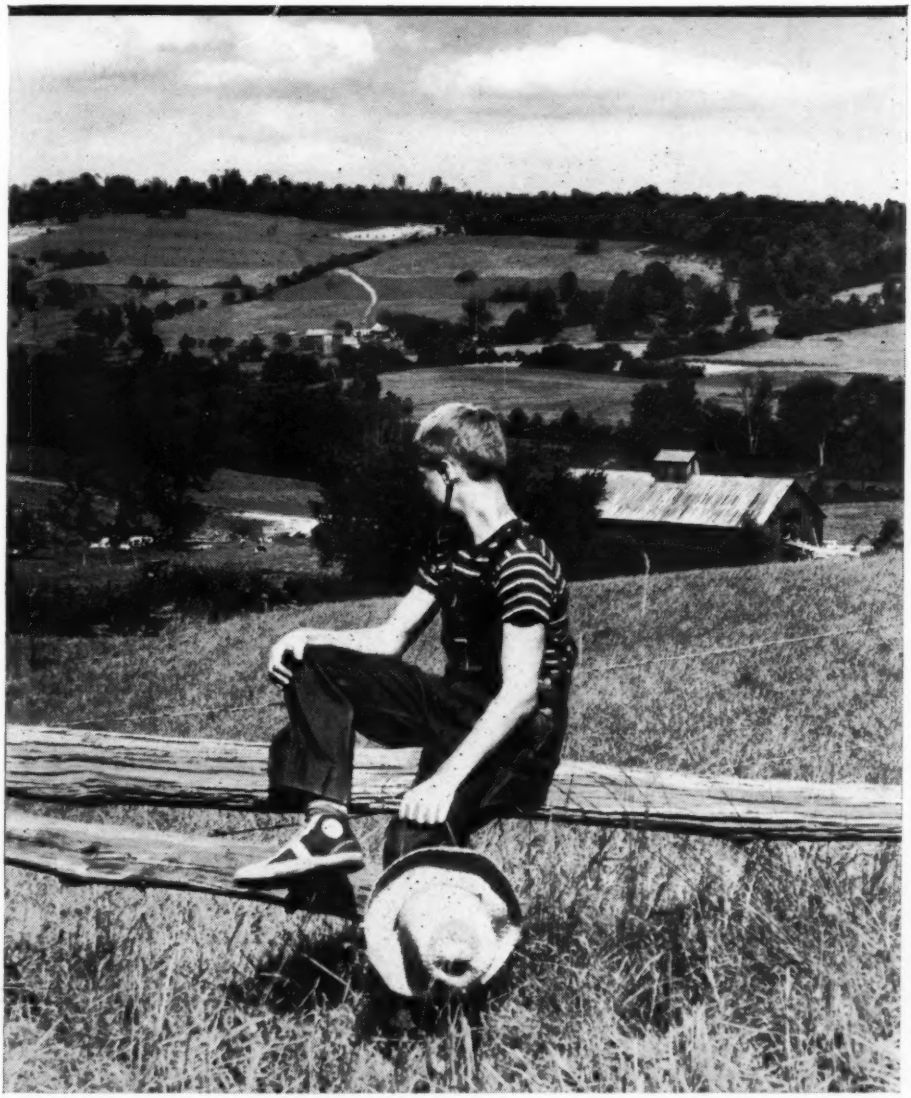

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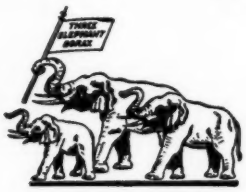

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Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXIX NO. 6

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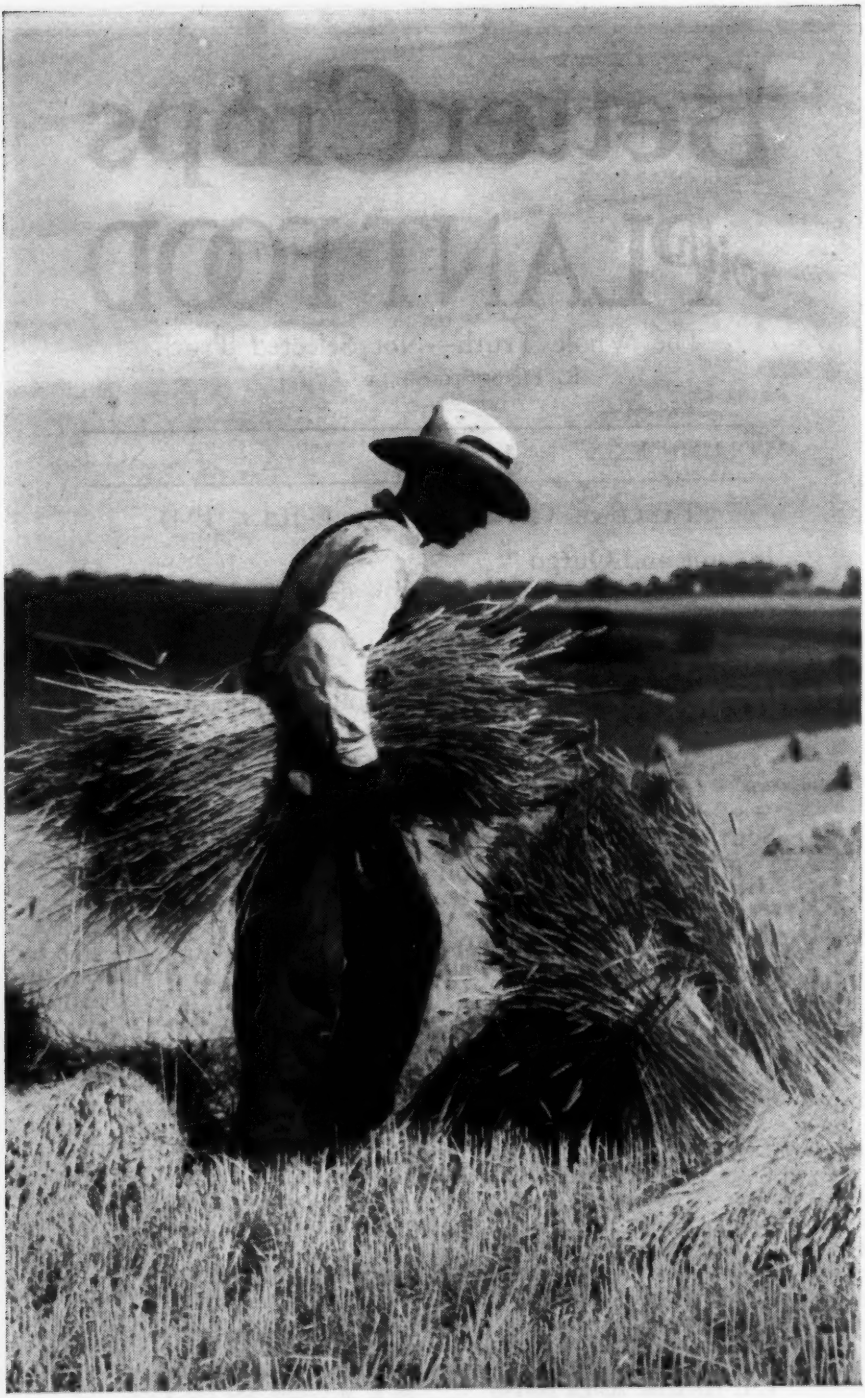

A GOOD CROP IN CAPABLE HANDS

Better Crops with PLANT FOOD

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VOL. XXIX WASHINGTON, D. C., JUNE-JULY, 1945 No. 6

Considering

Income and Outgo

Jeff McDermid

ANYONE with my native background knows the sufficient-unto-ourselves attitude common to our interior provinces and the arbiters of home opinion ever since we licked Spain in 1898. I often drifted into corner groceries to literally put one hand in the prune box and one foot in foreign prejudice, all in the same operation. Such verbal interchange usually followed mention of the advantages of free trade or, at least, lower tariffs. Sometimes it was Mr. Bryan's imperialism bugaboo, or the foolishness of ordering food delicacies abroad as long as better grub and more of it and cheaper could be had at home.

Many of my corner-store cronies had Dads with vivid memories of the threatening attitudes of England and France during the Civil War period. Others broached the Monroe Doctrine and put their own interpretation upon it as being a good place to begin an isolated era with as much freedom from foreign trade as from foreign diplomacy.

Now it isn't for me to sit up and howl in derision at those erstwhile beliefs of the Main Streeters and Town Hall dopesters, who regarded this continent as the richest in resources and the most bulging in brains of any land area on the planet. Being one of them, I had to admit that most of it was true; and such self-flattery is always a satisfying feeling until the age of adolescence busts up against adult realism in men as well as nations.

It's always a pain in the neck to take an opposite statistical side against home boosters, and all you get for your mental effort and library book-cramming is to have them hang a red quarantine card on you as a mental liability whom it is wise to shun.

Conservatism is not any better as a term to describe this small-town attitude than radicalism. In fact they were

radical indeed on the issue of self-reliance and non-communicative relations with all "foreigners." Even though our town had a German-born mayor who was somewhat of an Oberlord, an Irish constable, a butcher from Bulgaria, a barber from Britain, and a postmaster from Poland, and almost everybody's grandparents were washed ashore from abroad, the fetish against foreign influence and foreign imports was universal.

ENTIRELY absent from our daily appreciation were the scores of goods floated to our harbors over the same waves which docked the progenitors of our provincial isolation. Of course, we bought those imported things along with our own boasted larder replenishers like ham and pork loins, roast beef, veal, cabbage, pumpkins and potatoes, and the native cereals like corn and rye, as well as the popular distillates made therefrom. But yet nobody paid much heed to what our tables and our comforts would be like if we were ever under an overseas embargo.

Now I presume one good reason for this lies in the fact that we were just emerging then from a century of homesteading, prairie-breaking, and empire-building, a time of enforced economy, of bitter doses of home makeshifts, which taught us admiration for the country we had conquered and all it produced, and a shrug of indifference toward luxuries dangled before us by enterprising importers. Thus a combination of pride and prejudice, plus short shrift in the game of hard knocks, made us wish for a water barrier forever between us and the competing problems and products of the old world we regarded as decadent and distraught.

Some years ago in the Age of Internal Innocence (in which I was fetched up by hand) a song writer hit the popular fancy from tinpan alley clear to barbers' row, with the words "Yes, We Have No Bananas." I believe few in those days had any premonitions about queues waiting at groceries for staples, not to say delicacies, nor did any of us fully realize what could happen because our climate was not as favorable to banana production as our appetites were to banana consumption.

Checking up with my statistical friends who surround me, I find that the tropical tidbits of our childhood treats had reached tremendous import volume in the years prior to the Pearl Harbor sneak attack on our complacency. In that year our diet was gastronomically gladdened by 26 million pounds of dates from Iraq, 11 million pounds of avocados from Cuba, 15 million pounds of pears from Argentina, and 53 million pounds of nuts from Brazil, Portugal, and China.

IF your wife has been hoarding spices to make that birthday or holiday meal snappier, and your memories take you back to the chewing of cinnamon sticks or the home-coming use of cloves after a session with the revelers—then you'll check well on the following absent annual imports: 60 million pounds of pepper from Netherland Indies, 3½ million pounds of cinnamon from Ceylon, 15 million pounds of cloves from British East Africa, 8 million pounds of nutmegs and 4 million pounds of allspice from the South Pacific.

Such aromatic flavoring reminds us of the travels of Marco Polo, the dreams of Ghengis Khan, and the search for a safe spice route from India to Europe, which finally brought Columbus slap bang on the brink of our native land. Little did we think when we pored over stories of Bagdad and Singapore and the Arabian Nights Entertainments that circumstances would some day intervene to shut the door to entry of those oriental condiments, with no open sesame to invoke their admittance short of war and sacrifice. Maybe this sacrifice has not been severe or prolonged enough yet to shake us all into full world awareness, but as far as I am concerned, the lesson is learned and the scrap can stop.

You doubtless recall how some edibles of your early days were rationed

as luxuries and their possession was a mark of distinction. We even toted them to school, showing off. Take coconuts and chocolate as one case of this kind. Just before the war we brought in 127 million pounds of coconut meat from the Philippines and 690 million pounds of chocolate from Trinidad and the Gold Coast. Yet as I recall it when we ate our ice cream on social occasions, there was no chocolate dressing on it, and the cake with coconut shredded on the top layer was a rare party treat given by the Ladies Aid to raise church money. As for hot chocolate drinks, they were seldom used

in our community although I used to gaze at magazine pages in hungry wonder at the white-capped, trade-mark serving girl bearing those steaming cups to some pampered members of the elite.

I suppose if I had talked shop with that delicatessen dealer at our neighborhood corner years ago my appreciation of imported viands would have kept pace with my increasing dependence upon their tang and aroma. Right now would not be a happy moment to approach Mr. Spiegelbaum, however, about the aforesaid shipped-in stocks. Despair and worry have creased his brow and reduced his ample waistband. His shelves are bare of Portuguese anchovies, Costa Rica tuna, Labrador herring, Russian caviar, Spanish and Italian olives, Rocquefort cheese, and Italian Romagno. European countries are already trying to resume exportation of such luxury relishes to us, as a means to establish trade and create dollar balances to buy our commodities, for which there exists a promising outlet.

BUT when it comes to soap ingredients, the mainstay of our ancestors was lye leached from wood ashes, on which history says George Washington granted the first U. S. patent. In recent times commercial soap houses have depended upon coconut oil for 25 per cent of their manufactures, not to mention the imported aromatic oils and ointments which sales promotion efforts claimed to be equal to the best dope Cleopatra used to charm Anthony before the asp got her for good.

Oil crushed from the sun-dried meat of coconuts has lived through and survived many a row with dairymen, which may be one reason why so much of it has been diverted into the soap kettle. At any rate our ships go out loaded with war materials and return loaded with raw copra. The crushing will be done in this country since the Philippine mills are badly shot to pieces. But the demand out there at the copra source is for more trade goods from here, so if they don't get such goods in return these Filipinos may say "No soap" because cash money is not as attractive to them now as consumers' and durable goods.

Using an eraser at school all too often and being reminded en route thither in the rain to wear my rubbers, and taking an enema in the old-fashioned way at the business end of a long rubber tube and bag were the main contacts of my boyhood with this basic material which has since replaced horseshoes in everything except barnyard golf. The day of the limpid, gazelle-like female form encased in semi-elastic foundation garments had not impinged on our honest world of natural bumps and bulges during my simple adolescence. But since 1924, when I

(*Turn to page* 50)

Know Your Soil*

By Jackson B. Hester

Department of Agricultural Research, Campbell Soup Company, Riverton, New Jersey

NEVER before in the history of man has there been available so much knowledge about soils. There is on record a tremendous amount of information about the genesis of the soils, the classification, the physical attributes, the chemical composition, the agronomic aspects, and the economic value. Practically all of the agricultural soils of the United States have been carefully surveyed and mapped according to their physical attributes and economic value. Further, farming is one of the oldest and most honorable professions. Therefore, practical knowledge of growing crops accumulated through the ages is bountiful, yet it is no trivial task to make a success of farming. To be a successful grower one must know his soil. The object of this article is to point out some of the important fundamental things to be studied about a soil.

Perhaps one of the most fundamental things learned by soil research is that all soils differ. Strange as it may seem, they differ in practically every respect. No two soils have the same physical composition. Further, the chemical composition of all soils differs and so on down the list of sciences involved in soil research. The variations in color of soils on a single farm are familiar to every grower. The soils of New Jersey have all been classified and there are 193 different soil types in the State and 51 different soil series. The illustration in Fig. 1 shows the different soil zones in the State as outlined by Professor Linwood L. Lee (*Bul. 569, N. J. Exp. Sta.*).

Upon talking with a successful grower about his soils he will tell you of many differences in his fields. He will tell you he can plow one field two days after a rain, but he has to wait three days for another field. He will tell you that one field is best suited for the culture of strawberries, another field for potatoes, and a third field is best for tomatoes. Yet there is no perfect soil. Fortunately, man has studied the defects and has learned how to correct or get along with these defects. There has been accumulated a great deal of information on the production of tomatoes. Since crops differ so much in their requirements of a soil, it is fitting to take this one crop and try to outline some of the knowledge one should have in growing it successfully. Practically every farm in the eastern part of the United States is composed of several different soil types.

Know the Texture of Your Soil

All soils are composed of sand, silt, and clay. The amount of one or the other of these constituents determines the texture of a soil. A soil with a high sand content has an open texture and may be well-drained, whereas one with a large amount of clay has a close texture and may be poorly-drained. However, the latter statement is true only within a limited range for the composition of the clay has a great deal to do with the way it clings together or becomes packed. Some clays cling together in crumb-like structure and are well-drained. However, these two types of soils are entirely different in

*A paper delivered before the tomato growers of New Jersey and Pennsylvania, January, 1945.
Reprinted from THE AMERICAN FERTILIZER, January 13, 1945.

nature and must be farmed in an entirely different manner to produce successful crops. In the production of tomatoes in the humid region, soils that are well-drained must be selected. In other words, tomatoes should not be placed on soils that have low wet spots in them. See Fig. 2. Each grower must study his soils and avoid those fields that are likely to become "waterlogged" during the growing season. True, low wet fields may produce a good crop during extremely dry years, but one must take the soil selection that is most likely to produce a good crop during the average year and a fair crop even in the worst years. The nature of the drainage of the soil can be obtained by an examination of the subsurface soil (B horizon). If the soil below the surface or plowed horizon shows a mottled condition instead of a uniform color, the soil is not likely to produce a superior crop of tomatoes because of the lack of adequate drainage. See Fig. 3.

On the other hand, soils that are extremely sandy in nature are difficult to handle. The plant food supply and water-holding capacity are more than likely to be insufficient for economical yields. See Fig. 4. Therefore, select a uniform soil that has good internal and surface drainage whenever possible, but above everything study the soil type and farm it accordingly. Once the soils have been classified in respect to drainage and soil type and a system of management developed, select a system of crop rotation for the soil types and farming practices.

A Crop Rotation to Fit the Soil Type

Commercial fertilizers and lime are only supplementary to soil fertility. In other words, plant food from fertilizers only supplements that already found in the soil and cannot be expected to be the sole support of crop production. One of the most successful ways to maintain soil fertility is by proper crop rotation. By this is meant a system whereby soil depleting crops are not the only ones grown in the rotation.

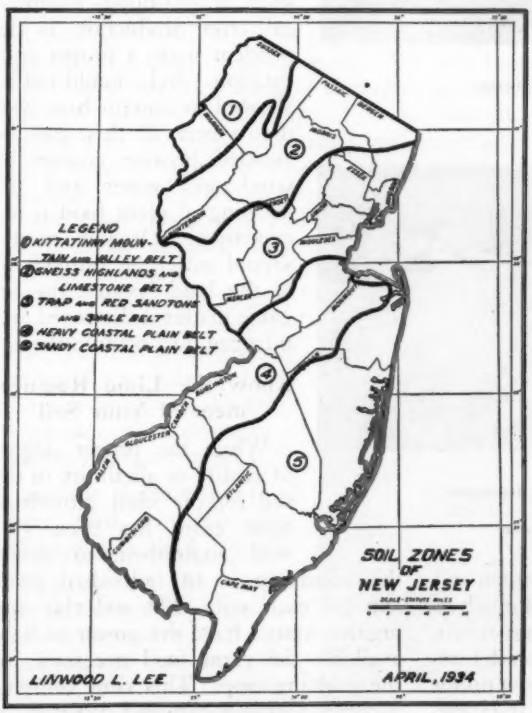

LEGEND
① KITTATINNY MOUNTAIN and VALLEY BELT
② GNEISS HIGHLANDS and LIMESTONE BELT
③ TRAP and RED SANDTONE AND SHALE BELT
④ HEAVY COASTAL PLAIN BELT
⑤ SANDY COASTAL PLAIN BELT
SOIL ZONES OF NEW JERSEY
LINWOOD L. LEE
APRIL, 1934

Fig. 1. Soil zones of New Jersey.

Tomatoes do exceptionally well after sod crops, corn with the stover returned, wheat, rye and oats with straw returned or after almost anything whereby a large amount of organic matter is plowed under. See Fig. 5. Corn, wheat, rye, oats, etc., give a cash return as well as add organic matter to the soil. The best of all is to have tomatoes follow leguminous crops like Ladino clover, soybeans, alfalfa, and the various other soil-improving crops where at least a goodly supply of organic matter is returned to the soil. These crops furnish fresh organic constituents for the

Proper surface and internal soil drainage.

Improper surface drainage.

Improper internal soil drainage.

Fig. 2. Soil drainage.

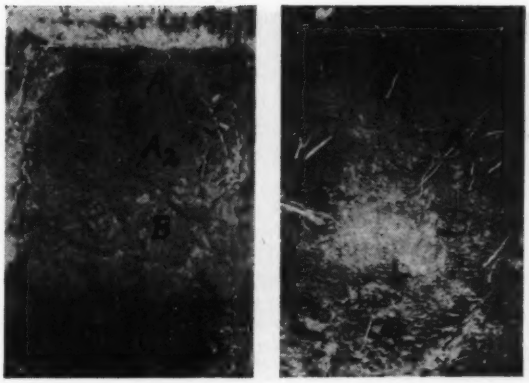
soil microbiological life to live upon and make available to the cash crop much of the plant food (calcium, magnesium, nitrogen, phosphorus, and potash) required by it, to say nothing of the minor plant food elements (iron, manganese, zinc, boron, etc.). See Bulletin 3 published by Campbell Soup Co. Research Department, Riverton, N. J. The organic matter added to sands decomposes more rapidly than that added to heavier soils. Therefore, when organic matter is added to sands a cash crop should be growing to get the benefit of it. Select cover crops that make the best growth on the soil under consideration. Fit the rotation to the soil type. The physical aspects of the soil are improved by the decomposition and building up of the soil organic matter.

The water-holding capacity and plant food supplying power of sandy soils and the drainage, aeration, and plant food supplying power of heavy soils are improved by proper crop rotation. In short, a continuous economical crop production is dependent upon a proper crop rotation. Soils should not be allowed to remain bare over the winter if this can be avoided because erosion by wind and water and the leaching of plant food is too expensive. Organic matter should never be burned off of the land because the organic matter is destroyed and nitrogen goes off into the air.

Know the Lime Requirement of Your Soil

While the proper degree of acidity or alkalinity in the soil for the ideal growth of most crops has been very well established, to obtain this condition is an individual problem for each soil. The soil clay and organic matter have the power to hold available the plant food necessary for the growing crop. This same complex becomes acid in nature and depleted for bases (calcium, magnesium, potassium,

and sodium). For the optimum growth of tomatoes, most vegetable crops, and many farm crops, this complex should be about 60 per cent saturated with calcium and about 20 per cent saturated with magnesium. In other words, when the soil is limed the acid nature of the clay and organic matter is saturated with the calcium and magnesium supplied by the liming material. This phase of soil improvement is very important.



Soil has good internal drainage. Soil has mottled B horizon —poor drainage.

Fig. 3. Determining internal drainage.

However, soils differ tremendously in the amount of lime necessary to give the desired results. The pH value of the soil only gives the extent of the depletion, but a test for calcium, magnesium, and the organic matter content and a knowledge of the soil type give information for determining the lime required. Each successful grower must have this information either through scientific analyses or through practical study. It is far easier and less expensive through laboratory studies than through practical experiments. See Bulletins 1 and 2 of Campbell Soup Co. Research Department. Sandy soils change more rapidly than heavy soils and must be subjected to chemical analyses more often.

Satisfying the lime requirement of the soil is only another step in getting ready for maximum crop production and supplying the other major plant food elements is another necessary step.

Know the Requirements of Your Soil for Nitrogen, Phosphorus, and Potash

The amount of nitrogen held in the soil is almost entirely associated with the organic matter content. The rate at which it becomes available is almost entirely dependent upon the texture of the soil, the composition of the organic matter, and the prevailing climatic conditions. The soil organic matter analyzes about 5 per cent nitrogen; therefore, if a sandy loam soil has 15 tons of humus to the acre (1.5 per cent) it will have approximately 1,500 pounds of nitrogen to the acre. Of this, probably less than 5 per cent will be nitrified in a year. Since some of the nitrogen is lost to the air and some leached, it is obvious that the supplemental must be supplied from cover crops, manure, and commercial fertilizer. A crop of 10 tons of tomatoes will utilize more than 100 pounds of nitro-

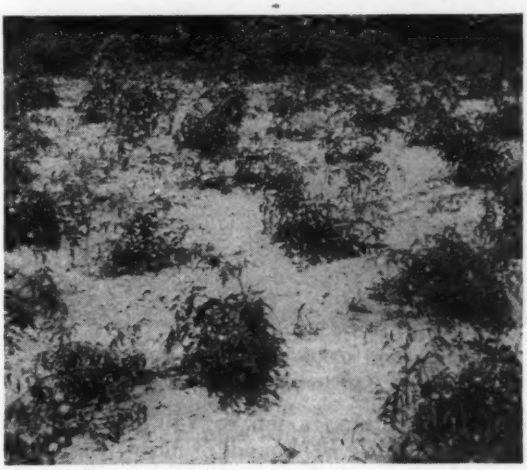
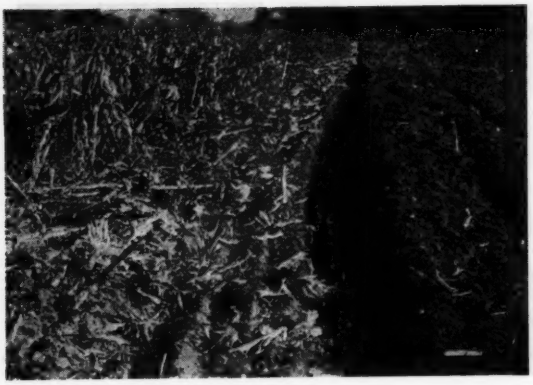


Fig. 4. Soil too sandy and too poor for tomatoes.



Corn stover.

Soybeans.

Weed growth, resting the soil.

Fig. 5. Excellent soil improving crops.

gen and it requires a ton of 5-10-10 fertilizer to supply 100 pounds of nitrogen. However, if the mere addition of 100 pounds of nitrogen to the soil was all that was necessary to supply the nitrogen, it would be pretty simple, but this nitrogen must become available as the plant needs it or it may be lost through leaching. The status of the absorption of nitrogen by 3,000 tomato plants is approximately 3 or 4 pounds the first month, 25 or 30 pounds the second month, and 50 or 60 pounds the third month. However, the plant is not in physical contact with all of the soil so there must be actually more than the above specified amounts available in the soil at any given time. Heavy silty loam soils may have 3 per cent organic matter and, due to the clay content, would have to have that amount to be equal in immediate fertility to a sandy loam with 1.5 per cent organic matter. A silty loam with 3 per cent organic matter would have 30 tons of humus or 3,000 pounds of nitrogen. However, due to the compact nature of the soil the organic matter would oxidize more slowly and would only give available about the same amount of nitrogen as the sandy soil.

The safest way to have adequate nitrogen in the soil available to the plant is through a good organic matter content and supplemented by plant debris, manure, and commercial fertilizers. An analysis of the soil for the organic matter content and a knowledge of the plant material returned to the soil give the grower a working basis for nitrogen fertilization. See Bulletins 1 and 3 Campbell Soup Co., Research Department.

(*Turn to page* 44)

Boron Content of Mississippi Soils and Plants

By Russell Coleman

Department of Agronomy, Mississippi State College, State College, Mississippi

SOILS vary greatly in the amount of boron which they contain and different plants vary in the amount of boron which they require. It is important to know the boron content of the most important soils and plants of each state. In order to obtain information on the boron content of Mississippi soils, representative soil samples were taken from the most important soil types of the State, and the available boron in each soil was determined in duplicate by the Berger-Truog method.[1] In most cases the A and B horizons of the soils were sampled and in some cases the C horizon was also sampled. The results of the analyses are shown in Figure 1.

The results show considerable variation in the available boron of the A horizon of Mississippi soils. The available boron in the B and C horizon was more consistent throughout the State. In most of the soils the A horizon contains more available boron than the B or C horizon; naturally this was expected since the A horizon contains more organic matter.

The results in Figure 1 give information on the relative amounts of available boron in the different soil areas of Mississippi. The soils of the Delta area are much higher in available boron than other soils of the State, and it would appear from the analyses made that most Delta soils contain about 2 ppm. available boron. In general, the soils of the Brown loam contain more available boron than soils of the other areas, outside of the Delta. The soils of the Longleaf Pine and Gulf Coastal areas in southern Mississippi probably contain less available boron than any of the other soils.

If the available boron, as determined, is indicative of the amount of boron available to plants, one might conclude from the results in Figure 1 that many soils, especially those in the Delta area, already contain enough boron to supply the needs of most plants; while many others, especially those in southern Mississippi, contain too little boron and probably need boron applications for the proper growth of plants.

Boron Content of Different Plants

In order to determine the boron requirement of different crops, samples were taken from the most important plants grown in the State, and the boron content of the plants, as well as the soils from which they were taken, was determined by the Berger-Truog method.[1] The results of these analyses are shown in Table 1.

In general, the leguminous plants contained more boron than the nonleguminous plants. Alfalfa, the vetches, and the clovers contained much more boron than oats, carpet grass, and corn. Even on the same soil type containing about the same amount of boron, the leguminous plants absorbed more boron. For example, hairy vetch grown on Norfolk sandy loam with 0.65 ppm. boron contained 13.0 ppm. boron, while oats grown on Norfolk sandy loam with

[1] Berger, K. C. and Truog, E. Boron determinations in soils and plants. Ind. Eng. Chem., Anal. Ed., 11:540-545. 1939.

0.93 ppm. available boron contained only 3 ppm. boron. Naturally, the amount of boron absorbed by the plants was partially determined by the amount of available boron in the soil. For example, hairy vetch grown on Norfolk sandy loam with 0.65 ppm. boron contained only 13.0 ppm. boron, while hairy vetch grown on Sarpy sandy loam with 2.1 ppm. boron contained 44.3 ppm. boron. Hairy vetch grown on Sarpy sandy loam, with three times as much available boron as Norfolk sandy loam, absorbed three times as much boron.

Of the different kinds of plant tissue analyzed for boron, leaves from tung trees contained the largest amount of boron (48.5 ppm.) even though the tung trees were grown on the soil (Ruston sandy loam) with the smallest amount of available boron (0.30 ppm.). This suggests that tung trees require large amounts of boron, and indicates that they can absorb it from soils which contain very little available boron. These results do suggest that tung trees may respond to applied boron.

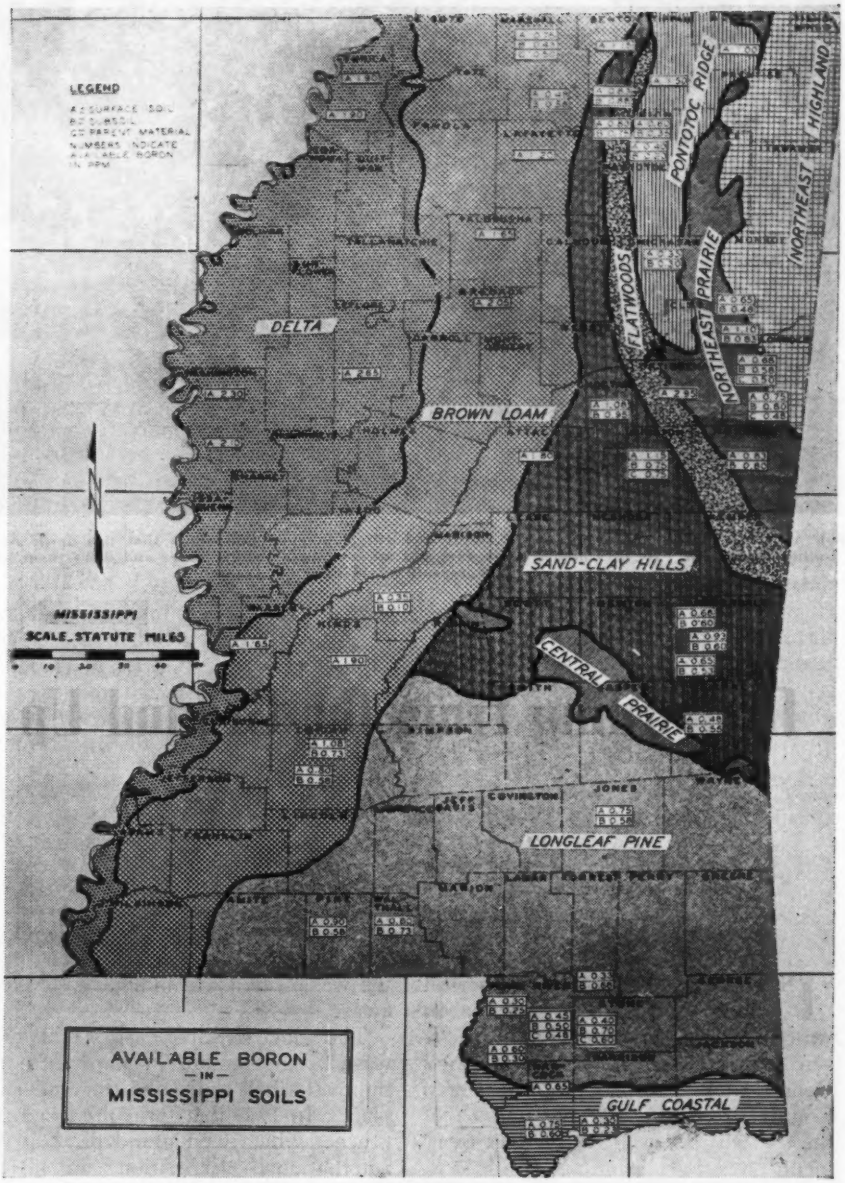
Results of the plant analyses show that different plants vary greatly in their demand for boron. In general, the leguminous plants require large amounts of boron and will probably respond better to boron applications than the non-legumes.

Effect of Boron Applications Upon the Boron Content of Soils and Plants

Further information on the relationship between the amount of available boron in the soil and the amount of boron absorbed by plants was obtained by analyzing soils and plants from field and greenhouse boron experiments. These results are shown in Tables 2 and 3. Results from the field experiments show that an application of borax to the soil did not greatly affect the boron content of the soil, although in most cases it slightly increased the boron content. However, applications of borax to the soil greatly increased the boron content of cotton plants, having increased it on Ruston sandy loam from 11.5 ppm. on the untreated plot to 19.0 ppm. on the boraxed plot. An application of lime to Ruston sandy loam reduced the available boron in the soil and

TABLE 1.—THE BORON CONTENT OF DIFFERENT PLANTS GROWN ON DIFFERENT SOILS

Kind of plant tissue	Boron in plant	Available boron in soil (A horizon)	Type of soil
	p. p. m.	p. p. m.	
Oats, leaves and stems	4.0	0.60	Atwood sandy loam
Hairy vetch, leaves and stems	15.0	0.81	Atwood sandy loam
Oats, leaves and stems	3.0	0.93	Norfolk sandy loam
Hairy vetch, leaves and stems	13.0	0.65	Norfolk sandy loam
Oats, leaves and stems	3.0	0.75	Ruston sandy loam
Hairy vetch, leaves and stems	44.3	2.10	Sarpy sandy loam
Willamette vetch, leaves and stems	45.0	2.10	Sarpy sandy loam
Bur clover, leaves and stems	36.5	2.10	Sarpy sandy loam
Alfalfa, leaves and stems	22.5	2.10	Sarpy sandy loam
Alfalfa, leaves and stems	25.5	2.30	Sharkey clay loam
Carpet grass, leaves and stems	3.5	0.60	Norfolk sandy loam
Lespedeza, leaves and stems	12.8	0.60	Luverne sandy loam
Corn, leaves	8.5	0.90	Brandon silt loam
Cotton, leaves	21.0	0.90	Brandon silt loam
Corn, leaves	5.0	0.80	Atwood sandy loam
Cotton, leaves	9.3	0.80	Atwood sandy loam
Tung tree, leaves	48.5	0.30	Ruston sandy loam



LEGEND

A = Surface soil
B = Subsoil
C = Parent material
Numbers indicate available boron in the ppm.

also the boron content of the cotton plants, but an application of borax with the lime corrected this by increasing the boron content of both the soil and the plant. The cotton in the field experiments was damaged so badly by boll weevils that the yields were of no value. An analysis of the plants, however, does show that where boron was applied to the soil, cotton plants absorbed more boron than where it was not applied.

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Bob Anderson reveals one secret to successful orcharding—a good grass crop that ties down and builds up the soil. He uses domestic ryegrass and other crops as winter cover and disks them into the topsoil in spring.

Orcharding from the Ground Up

By Walter W. John

Soil Conservation Service, Milwaukee, Wisconsin

"FEED the soil if you want the soil to feed you" is the principle on which Bob Anderson operates his 95-acre fruit farm in the Van Buren Soil Conservation District, Van Buren County, Michigan. He has found that the soil will pay well for the best treatment.

The Anderson farm is located in that sandy area of western Michigan where orcharding can be highly profitable. It also can easily be a complete failure if the soil is not tied down. Four miles away great dunes are creeping eastward under the force of winds off Lake Michigan. Several fruit farms in this vicinity have "gone to pot" because the soil was mistreated and allowed to blow away.

The most striking example of such waste is the famous Packard farm up the road a half mile from the Anderson place. In 1900 that farm produced the peaches which won grand prize at the International Exposition in Paris, France. Today it is a tragic reminder of man's neglect in land management. The prize trees have been replaced by sassafras sprouts and other scrubby growth, the topsoil is gone, and the wind has gouged great holes in the sandy subsoil. All that remains to recall more prosperous days is the concrete foundation where a fine house

once stood surrounded by well-placed shrubs.

In contrast, Bob Anderson has a well-protected farm and orchard of peach, apple, plum, and pear trees. He built his orchard on sound practices—literally built it from the ground up. With the cooperation of his soil conservation district and technicians of the U. S. Soil Conservation Service, he has developed a complete plan for conserving and improving the soil resources of his farm.

Bob is one of nine children of a steel foundry foreman who reared his family on an original 20 acres of the present Anderson farm. The only one who didn't go to college, Bob began his career in orcharding at an early age because of necessity, his older brothers having left the farm, and the next in line being five sisters. When he took over the 20 acres he initiated a soil-building program that left his conservative parent flabbergasted.

Plenty of fertilizer and organic matter go into the soil-feeding program. Each mature apple tree now receives from 25 to 40 pounds of 3-12-12 or 3-9-18 fertilizer annually and Anderson thinks he will increase the amount. Each mature peach tree receives up to 10 pounds per tree.

Why not put on lots of fertilizer, he says. The increased production of fruit more than pays for it. Anderson claims to have hauled the most expensive two-horse wagonload of fertilizer in Michigan. It cost him $260 back in the late 20's.

Organic matter is supplied by an annual crop of rye seeded in the fall and disked repeatedly in late spring and early summer to mix the residue well with the surface soil. The ground is fallowed in summer.

Field crops are not grown except to feed 3 head of livestock, or to feed the soil. The reason—one crop of peaches brought as much income as he could have obtained from 35 crops of wheat at 35 bushels an acre. If this sandy land isn't suitable for fruit or truck crops, it had better be put back in timber, is the theory. But it is good fruit land when properly managed.

Some orchardists won't put young

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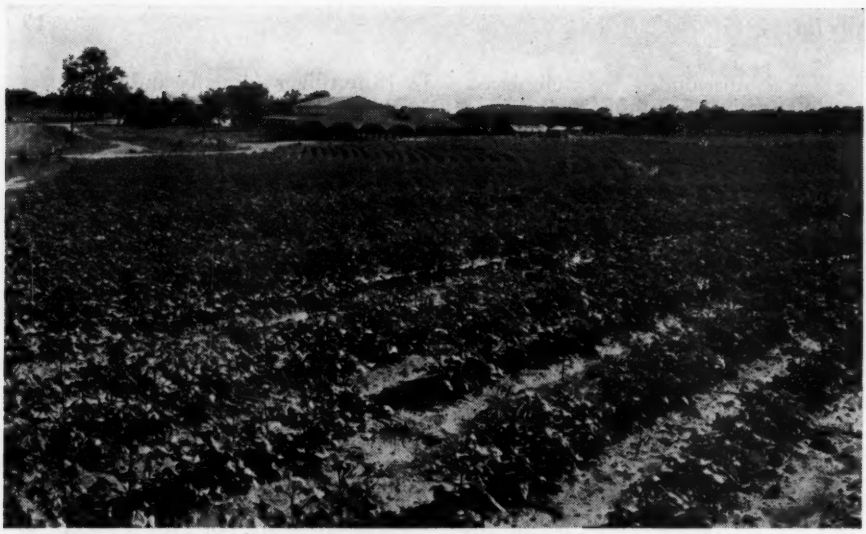
H. H. Bennett, Chief of the U. S. Soil Conservation Service, looks over the "ruins" of the once famous Packard orchard which grew the grand prize peaches shown at the International Exposition in Paris, France, in 1900. With its foundation—the topsoil—scooped off by wind erosion, the orchard gave way to sassafras and brambles.



An example of a diversified farmer using cotton as one means of obtaining cash income. In the background are a peach-packing shed and other farm buildings.

South Carolina Experts Tell How to Grow Cotton

By Jack Wooten

Farm Credit Administration, Columbia, S. C.

THE Clemson College Extension Service in South Carolina, which has done much to improve the quality and yield in cotton throughout the Palmetto State by aiding farmers in their problems concerning the fleecy product, have presented some highlights on how to produce the largest profitable yields of cotton per acre.

The data were prepared by a Committee of Extension experts, with recommendations furnished by representatives from a cotton seed company, the South Carolina Cotton Seed Crushers Association, the South Carolina Experiment Station, and others. All of these have had actual experience in various phases of cotton culture, growing, harvesting, and ginning.

In a brief introduction, the cotton experts declared:

"If South Carolina is to continue to lead the South in cotton improvement, farmers of the State should organize themselves in one-variety cotton improvement associations for the production of good quality cotton and use the best practices in production as well as harvesting and ginning.

"Every soldier requires one-half bale of cotton, which is ten times what the average civilian uses. The competition of synthetic fibers is now being felt especially from rayon, but the vast food, feed, and ammunition values of cotton remain.

"The average acre of cotton in South Carolina in 1942 and 1943 produced

89.5 pounds of oil along with 252 pounds of meal, 51 pounds of linters, and 125 pounds of hulls."

Certain practices are next recommended in order for farmers to get the largest economic yields of high quality:

1. Grow only those well-bred varieties of proven worth and known germination that normally produce a staple of one inch or longer. 2. Plant only wilt-resistant varieties on wilt-infested soils. 3. Where possible, regin all planting seed, and treat all planting seed with Ceresan.

What should be done about soils and preparation? Three things says the Committee: 1. Select the most fertile, warmest, and best drained soil, which experience has shown will grow off cotton fastest, and which will under normal conditons produce at least three-fourths of a bale per acre. 2. Preparation should be thorough and shallow, using a disc in addition to turning where a cover crop has occupied land. 3. Use rows 30 to 36 inches wide on Piedmont and Sandhill areas and 36 to 42 inches in Coastal Plains areas. The wider rows are especially for the longer length staples.

Soil Conservation Service Photo

Mopping cotton for boll weevils with 1-1-1 mixture.

As to fertilization the Committee recommends:

1. Apply fertilizer and bed 10 days before planting if possible.

2. Side-placement of fertilizer is desirable. Place the fertilizer 2 to 3 inches to the side and 2 inches below seed level. If this is not practical, use a small sweep or shovel plow to mix the fertilizer in the drill before bedding. Thorough mixing of fertilizer with soil is important.

3. Use 500 to 1,000 pounds of fertilizer per acre under the cotton, depending on soil type and fertility of land. Formulas recommended are 4-10-6, 4-8-8, and 5-10-5.

4. After chopping side-dress with 100 to 150 pounds of readily available nitrogen. If the 150-pound rate is applied, make two applications, the first application after chopping and the second three weeks later, depending on weather conditions. Where rust appeared in previous years or where legumes preceded cotton, top-dress with 50 to 100 pounds of muriate of potash with first application of nitrogen.

5. On the average cotton land, use one ton of lime per acre every three to five years.

The Committee says there are three things to remember when it comes to planting: 1. Early planting usually gives highest yields. 2. Use at least one bushel per acre of seed germinating not less than 80 per cent. Plant larger amounts if germination is less than 80 per cent. A full crop is not possible without a good stand. 3. Plant on a firm seedbed.

The instructions on cultivation are simple and to the point: 1. Thin cotton to two to three stalks per hill every hoe-width apart. Do not destroy the stand of cotton by careless chopping, hoeing, or plowing. Close supervision should be given to this practice. 2. Cultivate shallow and often enough to control weeds and grass.

Boll weevils will play havoc on most cotton farms unless something is done about them. Here are the recommen-

dations of the South Carolina Committee for the control of the pest:

1. To control the boll weevil, make three early applications of 1-1-1 poison mixture at intervals of five to seven days. Make the first application just before the first squares appear. Prepare poison by mixing well one pound of calcium arsenate and one gallon of water, add one gallon of black strap molasses, and mix thoroughly. Use this mixture same day it is prepared. Apply with a mop held in front of the worker so as to strike the cotton plant one to two inches below the bud, pushing the plant over so that most of the poison is applied to the underside of leaves and on stems. There are several mechanical mopping machines that have proven satisfactory. Where any one application is washed off by rain within 24 hours, it should be immediately repeated. There are several substitutes for molasses which are proving effective.

2. Where as many as one out of 10 squares on the stalks are punctured, later applications of calcium arsenate dust and lime (equal parts) may be made at the rate of about 4 to 6 pounds per acre, at intervals of 4 to 5 days until a total of three applications are made. If any application is washed off by rain within 48 hours, it should be immediately repeated. The amount of calcium arsenate applied per acre should be kept as low as possible to prevent soil poisoning and lice damage. The addition of two per cent nicotine in the dust should be made to keep down plant lice when necessary. When the nicotine mixture is used it must be applied when the temperature is high and the air is very still to be effective.

3. Picking up squares, beginning when first blooms appear and repeating weekly for three weeks, is a good practice where labor is available.

4. It should be remembered that good all-around cotton farming is a vital factor in making cotton under boll weevil conditions, and poisoning is just another aid.

Harvesting and ginning are important to both farmers and ginners. The committee has six suggestions for the farmers:

1. Pick promptly after opening to preserve value. Cotton may damage in the field even if bad weather or storms do not occur. 2. Keep trash out

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Soil Conservation Service Photo

J. B. Wood, District Conservationist, Pee Dee soil conservation district, left, with a group of field technicians in consultation on a farm program.

Gravel-Culture Tomatoes

By Richard M. Caldwell

A. and M. College, Stillwater, Oklahoma

AN upstart of a fruit, the love apple, looked upon intolerantly before 1830, has handed down a royal legacy that celebrates its 115th anniversary this year. The love apple became the tomato and the tomato has unleashed a heritage that won't stop and its legacy has not ceased to bring increasing dividends.

Among the current exponents of tomato culture today horticulturists of the Oklahoma A. and M. College are making some of the most noteworthy strides west of the Mississippi. "Hothouse guinea pigs," that's what they call them growing in various proven experimental plots in the college greenhouse. Among these long-term experiments are the wonderful specimens grown by a process called hydroponics, chemical gardening, tray agriculture, bathtub or dirtless farming, and most currently, gravel culture.

Rudimentary gravel culture was popularized and propagandized a few years ago by W. F. Gericke, of California, yet the process was known to Europeans even in 1699. The successful cistern solution was originated by Wagner and Poesch of Ohio.

The fundamental idea underlying this method is to supply the roots of the plants with proper minerals required for normal growth. By this method the plants are grown in either water, sand, gravel, cinders, or other similar materials to which sufficient plant food is supplied in solution.

Back of this process in the Midwest are two Sooner scientists, W. Raymond Kays and Franklin A. Romshe, who are making of it a realistic, paying proposition. Back of them is Elmer L. Hartman, who started the new process at A. and M. several years prior to his recent entry into the armed forces, and Dr. Frank B. Cross, department head. These men are hard at work for stepped-up wartime food production and for the postwar period.

Franklin A. Romshe, Oklahoma tomato specialist, examines rich clusters of tomatoes, rooted in gravel, grown without soil, and dependent on plant food in water solution for their livelihood.

Gravel culture is their current scientific twist. It is making the tomato season a year-round cycle in cold climates and revolutionizing the present and future of greenhouse winter gardening. What it is doing with substitute plant food from natural sources for tomatoes, it can do for cucumbers, melons, and other vegetables and flowers. The process has about shifted out of the experimental era.

Oklahoma horticulturists have already sent gravel culture to war. It went to the distant South Pacific atolls when two army personnel officers heard of the process on a recent trip

to Oklahoma. They visited the A. and M. greenhouse, observed the method, took notes on procedures and formulas, and returned to their distant outposts with necessary chemical nutrients. They tried out tomatoes, melons, and lettuce in a gravel base. They had no soil to work in. Their experiment worked.

Although gravel culture looks simple, it is as precise as an equation. Tomato seeds are first planted in soil. They are transferred and anchored in gravel-filled benches when about six or eight inches high. Beneath these benches are three-foot canals of chemically nutritioned water that is pumped by a continuous circuit into the gravel, making the necessary food available to the plant roots.

The plants are set out early in September and begin their yields about mid-November. The chemical plant food is changed every month and the cost of the nutrient is relatively low. The feeding fluid contains potassium nitrate, ammonium sulfate, magnesium sulfate, calcium sulfate, and monocalcium phosphate in proper proportions.

The advantage of gravel-culture tomatoes over hothouse plants, as seen today, lies in the fact that the method saves time and money in the long run, allows a minimum number of operators to achieve maximum results, produces tomatoes at an earlier maturity, does away with weeds and soil cultivation, and is the quickest method for current experimentation on stem growth and production expectancy.

Sand and gravel cultures in which the plants grow in an inert media for support and into which the solution is pumped at intervals to supply water and plant food, such as the A. and M. tomato project, are better able to obtain the necessary air as well as water for proper growth since they are not continually submerged. The plan may well be compared with sub-irrigation.

Plant spacing, temperature, fertilization, stem size, leaf maladies, with accent on pollenization, summarize to some extent the major points for observation during the growing period.

Taking their cue from only slightly developed sources, experimenting constantly, these Oklahoma specialists have produced gravel-culture plants that grow to a maximum length of 25 feet and are loaded with tomatoes. In one small plot of 144 plants alone, the yield is 640 pounds of tomatoes in a

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Gravel-culture tomatoes are firm, full-flavored, and grow luxuriantly on hothouse vines.

Harvesting of seed is in progress on this luxuriant Ladino clover-mixed grass sod in the orchards at Pennsylvania State College.

Balanced Sods in Orchards

By Fred V. Grau

Pennsylvania State College, State College, Pa.

BALANCED sods in the orchard are to the fruit grower what good hay and pasture sods are to the livestock farmer. They represent an advantage by which an equilibrium is maintained between the cash crop and the soil. Continued production consists of maintaining a balance between opposing forces. In the orchard, the opposing forces are represented by loss of top soil through erosion, loss of nutrients by leaching, loss of organic matter by accelerated decay, loss of moisture-holding capacity in the soil, and loss of ground cover by poor management practices. These opposing forces are largely balanced by means of good sods which in turn must themselves be balanced against other factors.

According to the best evidence, a truly balanced sod is roughly half grass and half legume. An all-grass sod requires abundant supplies of nitrogen and can make none. An all-legume sod produces nitrogen in excess but builds little organic matter in the soil. By combining the two, the nitrogen-hungry grass is fed by the nitrogen-gathering legume and organic matter is built at a more rapid rate by the union. The production of dry matter of the balanced sod, as compared with an unbalanced sod, is represented by these general figures:

	Pounds dry matter per acre
Grass alone	3,000
Legume alone	4,000
Grass plus legume (balanced sod)	6,000

The species in a sod must be balanced against the forces of climate if the sod

is to be effective. There is considerable overlapping, but one would not select lespedeza for New England orchard sods nor would red fescue, which does so well in northern cool climates, necessarily be selected for hot dry sites to the south. Bermuda grass grows well south of the Mason-Dixon Line but is not winter hardy to the north. Ladino clover seems to be adapted over the entire northeastern region, the same as alfalfa, red clover, and white clover. The more common, widely adapted grasses for the Northeast include the bluegrasses, the fescues, orchard grass, and timothy.

Two Types of Sod

A sod must be balanced against certain soil conditions. Low organic-matter content frequently is an opposing factor in orchard soils. This means lower moisture-holding capacity and poor physical condition of the soil. Where this occurs, it is important to select those species which tolerate these conditions. Red fescue grows better than many other grasses under these adverse conditions. Kentucky bluegrass thrives best where the soil is relatively high in organic matter and holds moisture well. Ladino clover grows best where soils are high in fertility, organic matter, and moisture. Sweet clover, birdsfoot trefoil, and lespedeza, on the other hand, tolerate the more unfavorable conditions of low organic matter and low moisture-holding capacity.

In order to have a balanced sod for different types of management, there are two types of sod to consider: First, the temporary sod which is destroyed regularly at a certain season and then reestablished; and, second, the permanent sod which is desired to remain productive for many years. With the permanent sod, two types of management are practiced: First, periodic mowing to control seeding of weeds and certain undesirable grasses; and, second, an almost complete neglect of mowing which with certain species produces an undesirable, unbalanced sod that largely fails in its intended purpose.

A temporary sod should be one which is readily destroyed but which can be reestablished quickly and easily. Ryegrass and lespedeza or ryegrass and vetch are balanced temporary sods that will fill most requirements. Permanent sods which require frequent mowing for best results are Ladino clover-grass mixtures. Where little or no mowing is likely to be done, a better balanced sod may be red fescue and birdsfoot trefoil or bluegrass and birdsfoot. It is recognized that Ladino clover is one of the better orchard covers and also that birdsfoot trefoil is as yet practically unknown to orchardists. But from the standpoint of a balanced sod against some of the stated opposing forces, I submit that there may be some of these lesser-known grass-legume combinations which may be decided improvements over the sods now in use. In many cases, it will come down to a decision as to whether to select a balanced sod and then condition the soil and management to fit that sod, or to select a balanced sod that fits the ready-made conditions. This decision is forever and unalterably one which the individual must make.

Some sods may be better balanced than others in their effect on the main crop—the fruit crop. It is generally agreed that deep-rooting alfalfa may compete too seriously with the trees for moisture during critical periods. The same would be true of sweet clover if it were allowed to grow to maturity. A sod which tends to become dormant during dry spells, such as bluegrass or red fescue, offers little competition for moisture. Likewise, it has been indicated that certain sod crops harbor diseases and insects of fruits worse than others. Proper balance here would indicate selection of those sods that are least competitive to the main crop.

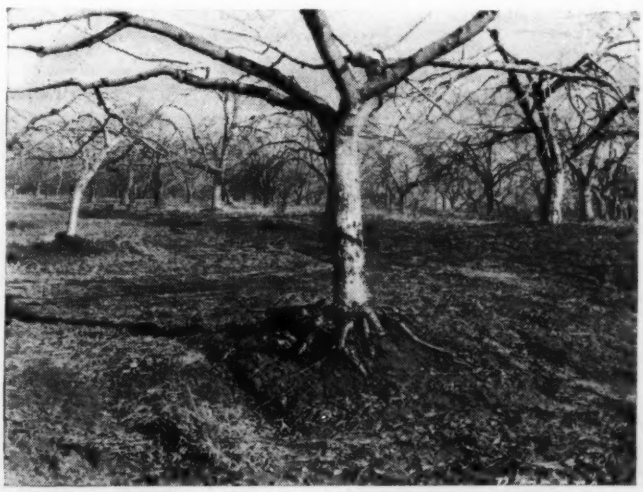
Thus far, we have discussed those factors which necessitate balanced sods together with some of the advantages of balanced sods. The next step is that of how to establish and maintain them to the best advantage.

Recent experiments on pastures and

hay fields prove that the simplest and most effective method of establishing a grass-legume cover is to destroy existing vegetation in the summer or early fall by discing or harrowing. The important thing is that the lime and fertilizer are worked into the soil in the fall where they will be ready to go in the spring. Leaving the trash on the surface prevents erosion and greatly aids in the absorption of moisture. To consider that the rough surface wouldn't be much of a seed bed is an error. When the seed is sown on the frozen soil about the time honeycombing takes place, it will find as good a place to germinate and grow as though a drill had been used. More than this, the rotting organic matter acts as a tonic and a stimulant to the young grass, and the early quick start gets the grass 'way out ahead of the weeds. Spring preparation is all right, but the seeding is bound to be later, weeds will be worse, and the live grass-cover over winter is bound to harbor mice. I am not advocating the destruction of the ground cover every fall, not by any means. I'm thinking of the growers who do not have the "balanced sods" they need and who may be in the business of establishing a different kind of a sod from the one they have.

As important as balancing sods for best results is the question of balanced fertilization. Without the latter, the first may be extremely difficult of achievement. If soils are highly productive and the fertilizing program has been of the highest type, there may be no need for any additional fertilizer. But when sods are thin, weeds are prevalent, and the need for fertility is evident, good grass and legume seed should not be wasted by sowing it on unfertilized soil. It is too precious to waste in these days of Ladino clover at $2.50 a pound and red fescue at 85 cents.

Where fertilizer is needed, a recommended fruit fertilizer is the first choice. For the cover crop a good complete fertilizer will be best—say 400 to 500 pounds to the acre of an 8-16-16, 4-12-12, or similar analysis. Next best is an 0-1-1 ratio (0-12-12 or 0-14-14) at around 500 pounds to the acre. Legumes need ample supplies of phosphorus and potash, especially where no manure can be supplied. The important thing is to get this fertilizer worked into the soil during the discing operation. Experiments have shown that the fertilizer is not lost during the winter when the trash is left on the surface. A program like this is going to cost money, true, but an orchard can be no better than the cover, and the cover will be the first to tell when the fertility level begins to drop. It may be expensive to wait until the fruit crop tells the story.



This Pennsylvania orchard shows the results of serious sheet erosion. Lack of a balanced sod and excessive cultivation are responsible for this condition.

The selection of the kind of sod to grow is one of the

important phases of having balanced sods in the orchard. Some of the factors of management have been discussed, but one feature deserves further mention. No matter what in the way of grasses and legumes is selected, mowing will be essential for the good of the sod itself. Young grass and clover plants are easily choked by weeds, and weeds are bound to be present in a good soil. One exception is orchard grass which seems to be able to survive even under a heavy weed cover. I wonder if it didn't get its name by the very fact that it was one of the few grasses that could survive the rough treatment and the heavy competition in old, heavily shaded orchards.

Ladino clover seems to be an outstanding favorite among orchardists. It is a newcomer to us but an extremely popular one. It grows well on most of our soils but does best where the soil is rich and moist, or where the frequently clipped growth is allowed to fall to the ground where it acts as a mulch to keep the soil cool and moist. Consider now that the leaves and petioles of Ladino clover may analyze as high as 38 per cent protein on a dry basis, which is equivalent to about six per cent nitrogen, and that the total dry matter production of a good Ladino sod in a year may be over two tons to the acre. It can be realized that with a balanced sod there is a lot of nitrogen being fed to the trees out of the air by way of the Ladino clover. Better than that the loss of calcium, phosphorus, and potash will be small because the roots continue to draw these minerals from the soil and re-deposit them on the surface where the leaves decay and return the minerals to the soil and to the trees in an available form.

Ladino clover seedings will be most successful under these conditions:

1. A nearly "sweet" or neutral soil (pH value of 6.5 to 6.8).
2. Ample balanced supplies of phosphorus and potash.
3. A solid seed bed.
4. Surface seedings on frozen ground in late winter.
5. Sowing one to two pounds to the acre with light seedings of non-competitive grasses like timothy or red fescue (not over five pounds to the acre of the grasses). Right here I want to say that I have been impressed by the

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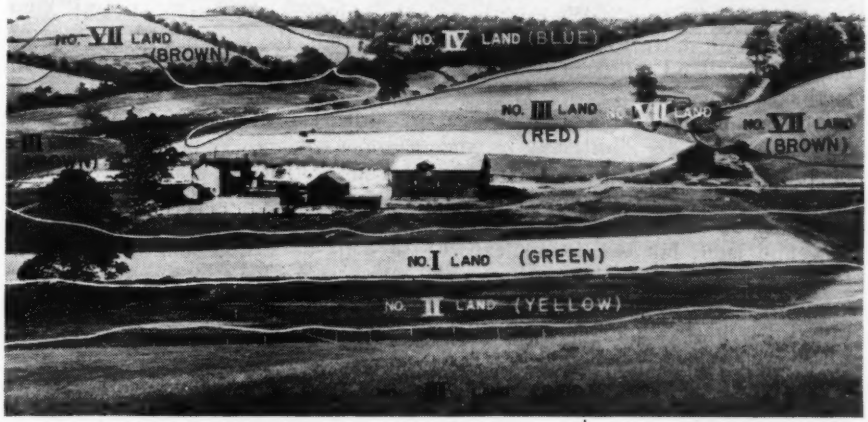
This peach orchard in Adams county, Pennsylvania, planted on contour with terraces and cover crop of rye and vetch for summer mulch, emphasized importance of good management.

Selective Service for Each Acre

By J. W. Sargent

Soil Conservation Service, Spartanburg, South Carolina



LAND USE CAPABILITY CLASSES

SUITABLE FOR CULTIVATION

I. Requires good soil management practices only.
II. Moderate conservation practices necessary.
III. Intensive conservation practices necessary.
IV. Perennial vegetation-infrequent cultivation.

NO CULTIVATION-PASTURE, HAY, WOODLAND, AND WILDLIFE

V. No restrictions in use.
VI. Moderate restrictions in use.
VII. Severe restrictions in use.
VIII. Best suited for wildlife and recreation.

THIS country is committed to the policy of selective service, not only of its manpower, but of its factories in meeting war production goals. Selective service of acres to meet agricultural production requirements for the postwar as well as the war period means on the one hand, using the land according to its ability and treating it according to its needs, and on the other, it means meeting production requirements on a basis of sustained yield. This is certainly of as much importance as selective service in any undertaking.

A permanent agriculture can be guaranteed (1) by carefully selecting, on the basis of the physical ability of the land to produce, the best use which the land may serve; (2) by adjusting this production to economic requirements; and (3) by treating these farms, fields, and acres in accordance with their needs and adaptabilities. It is a big order actually to locate these acres by their physical characteristics, to determine the use in which these varied lands can make their best contribution, and to specify and apply the treatment that

they must receive. But we know of no prospect of a permanent agriculture without it. These are the things we mean by a Soil Conservation District Program.

We are in an all-out fight which does not end with military victory. We must win that victory, of course. But it's more than our Army against our enemy's, it's more than our Navy against theirs—it's that and our farms against theirs, and against our unknown future, not for the duration only but for the long pull for sustained production. That's why we insist on "Selective Service for Each Acre." We can't have poor, misused, ill-treated, washed-away, unproductive land represent us now or in the peace to follow.

The meaning of "Selective Service for Each Acre" is illustrated by the photograph.

Every acre of agricultural land can be made to produce the things needed now and later, but we do not expect to produce planes in a shell factory nor tanks in a shipyard. Neither can we expect sustained economic production of cotton, corn, peanuts, or other row crops on steep or eroded land best suited to trees or grass, because row crops cause severe soil losses which quickly make the land unfit for any productive use, perhaps for many years to come. Look at the green area—No. I land—in the photograph. Green is the "go" signal and means that this land can be used intensively for row crops without danger.

Yellow means caution, and this land, No. II, may be used but needs protection—winter and summer covers, contouring, rotation, and lime and fertilizer as required. Without such protection, it may be expected to yield a bale of cotton in exchange for 12 tons of soil. If the land is protected, the bale of cotton may cost only three tons of soil. Without protection, the land may last 35 years under continuous use, but with protection the farmer can reasonably expect it to last upwards of 100 years, depending on the degree of protection.

The larger part of this farm, as of most cotton farms, is No. III land. In the photograph, it is red—the danger signal. This land can be used, but it will be destroyed quickly unless the proper conservation practices are applied. Such land generally is steep, or poor, or badly gullied, or all three. The treatment required necessitates a careful analysis and the application of proper intensive treatments before the land can be used safely for row crops. Land of this sort will produce cotton, but the cotton will cost around 75 tons of soil per bale without protection, and we cannot expect sustained yield. With protection, the cotton will cost around 12 tons of soil per bale, which represents a saving we can't afford to miss.

Other lands shown in the photograph are not generally suitable for row crops, but are suitable for grass, perennial hay, or trees. If the land's capability is determined and proper conservation practices are understood and applied, every acre may be kept in sustained production.

We cannot maintain—let alone increase—agricultural production, economically or otherwise, on eroded, wasted, depleted soils. Our agricultural production experience during and after the First World War should serve us well now. In that emergency we brought a vast new acreage of land under the plow. The additional acreage actually increased production about 5 per cent but created another emergency—the Dust Bowl in the West and increased gullying in the Southeast. There must be no repetition of those unnecessary errors.

Today with less labor, less fertilizer, less farm machinery, and less new land, agricultural production is being increased. Favorable seasons have helped and the determination, dependability, and ability of farmers have been vital, but this new "farm tool"—using the land according to its capabilities and treating it according to its needs, including application of needed soil and water conservation practices—accounts

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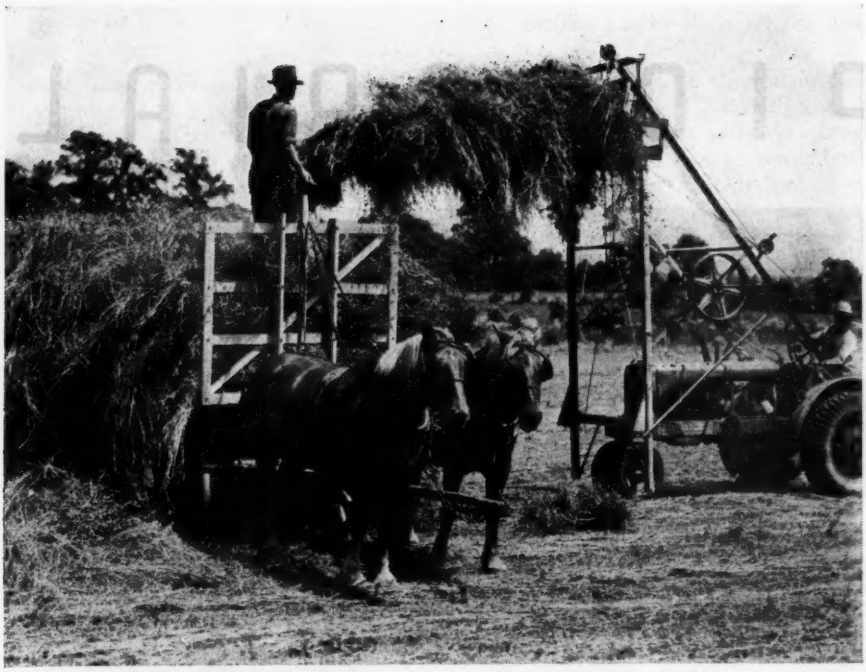
PICTORIAL

The Season When Keen Edges Count



Hay and Grain

Salt and Water

Above: **There is good pasture on the Voegeli Brothers' Brown Swiss Farm at Monticello, Wisconsin.**

Below: **The barns of the St. Albans Guernsey Dairy, St. Albans, Missouri, are modern throughout.**

The Editors Talk

The Plant Speaks

As can be noted on the back cover of this magazine, the American Potash Institute is announcing completion of a new series of motion pictures entitled "The Plant Speaks." Based on the methods of interpreting plant-food deficiencies, the series is divided into four reels to cover starvation symptoms on the plants themselves, soil tests, tissue tests, and leaf analysis.

The films are in full color, 16 mm., and sound, and can be individually described as follows:

THE PLANT SPEAKS THRU DEFICIENCY SYMPTOMS pictures soil depletion and erosion, bringing out the tremendous losses of plant food resulting therefrom. Deficiency symptoms on field and orchard crops are shown and described in detail to familiarize audiences with the hunger signs with which plants will tell their needs. This film is on an 800-ft. reel and the running time is 25 minutes.

THE PLANT SPEAKS, SOIL TESTS TELL US WHY treats with this oldest and most widely used chemical method of inventorying a soil's fertility—where and how to take soil samples on the farm and the value of soil tests when interpreted by experienced soil chemists. (On 400-ft. reel, running time 10 minutes.)

THE PLANT SPEAKS THRU TISSUE TESTS shows how a plant can be tested chemically in the field to see whether it is obtaining enough plant food from the soil. In this way it is possible to determine what fertilizers should be added so that the soil can provide the requirements of the growing crop. (On 400-ft. reel, running time 14 minutes.)

THE PLANT SPEAKS THRU LEAF ANALYSIS explains what can be learned from the amounts of plant food in the growing plant. It records the function of leaves in crop production and shows how leaves are sampled and analyzed in the laboratory for their plant-food content. The value of this analysis in deciding upon the amount of fertilizer required by crops is emphasized. (On 800-ft. reel, running time 18 minutes.)

This series of films has been added to the other motion pictures which the Institute is pleased to loan for showings by agricultural colleges and experiment stations, county agricultural agents, vocational teachers, government agencies, responsible farm organizations, and members of the fertilizer trade. The series is educational in nature, and previews by several official agriculturists have appraised it as a marked contribution in helping growers to understand this agricultural science in their service. It is most effective when the films are shown one at a time, that is, when booked for showings at least one day to a week apart and in the sequence in which they have been described here.

Because of war restrictions on film stock limiting the number of copies, requests

for these pictures should be made well in advance of the desired dates of showing. Requests should include information as to the group before which they are to be shown, alternative dates of showing if possible, and the period of time of loan.

National Farm Safety Week 7/22-28

It is well for the Nation to pause once a year and seriously consider the safety of its farm people. Human nature being what it is and with the high tension everyone has been under during these past few years, it is natural to forget that farming is a hazardous occupation. Perhaps in no other is there the same combination of the elements, machinery, and animals to necessitate a constant awareness of the danger of accidents. A few facts issued by the National Safety Council of Chicago help in this realization:

The average time loss because of accidents in 1943 was about 4 days per farmer. . . . A farm home or farm building catches fire every 15 minutes during the day in the United States. . . . The cost of farm fires totals around a quarter of a million dollars each day. . . . The tractor, an all-year-round machine, is involved in more fatal accidents than any other farm machine in all states reporting this information. . . . Of all farm animals, horses caused the most injuries. . . . More people were killed by accidents in farm homes alone last year than were killed in the great Chicago fire, the sinking of the Titanic, the San Francisco earthquake and fire, and the Johnstown flood combined. . . . If every person in the State of Kansas were injured, the total number would be about the same as the million and a half injuries suffered by farm residents in the United States last year.

President Truman's proclamation lends further seriousness and the note of caution and pledge for alertness which should be carried by all farm people throughout the year to come:

WHEREAS the Nation recognizes that the skill and labor of its farmers are a vital factor in winning the war, and the production of food one of the most essential means of winning the peace; and

WHEREAS the inevitable decrease in available farm labor this year creates an especially urgent need for conserving farm manpower to meet production goals in 1945; and

WHEREAS the accidents which cause some fourteen hundred farm residents to lose their lives each month, and one hundred and twenty-five thousand others to suffer injuries, constitute an unnecessary waste of human life as well as of time and material:

NOW, THEREFORE, I, HARRY S. TRUMAN, President of the United States of America, do hereby call upon the Nation to observe the week commencing July 22, 1945, as National Farm Safety Week. And I request all persons and organizations concerned with agriculture and farm life to do everything in their power to educate farm people in the proper precautions by which they may eliminate farm hazards, and to stimulate a nationwide determination to stop the needless waste of irreplaceable farm manpower and property. And I further urge that farm people everywhere observe National Farm Safety Week by making a safety check in their homes and on their farms.

Farm Prices of Farm Products*

	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
1910–14 Average	12.4	10.4	69.6	87.6	64.8	88.0	11.94	21.59	....
1920	32.1	17.3	249.5	175.7	144.2	224.1	21.26	51.73	....
1921	12.3	19.5	103.8	118.7	58.7	119.0	12.96	22.18	....
1922	18.9	22.8	96.7	104.8	58.5	103.2	11.68	35.04	....
1923	26.7	19.0	84.1	104.4	80.1	98.9	12.29	43.69	....
1924	27.6	19.0	87.0	137.0	91.2	110.5	13.28	38.34	....
1925	22.1	16.8	113.9	171.6	99.9	151.0	12.54	35.07	....
1926	15.1	17.9	185.7	156.3	69.9	135.1	13.06	27.20	....
1927	15.9	20.7	132.3	114.0	78.8	120.5	12.00	28.56	....
1928	18.6	20.0	82.9	112.3	89.1	113.4	10.63	37.70	....
1929	17.7	18.6	93.7	118.4	87.6	102.7	11.56	34.98	....
1930	12.4	12.9	124.4	115.8	78.0	80.9	11.31	26.25	....
1931	7.6	8.2	72.7	92.9	49.8	48.8	9.76	17.04	....
1932	5.8	10.5	43.3	57.2	28.1	38.8	7.53	9.74	....
1933	8.1	12.9	66.0	59.4	36.5	58.1	6.81	12.32	....
1934	12.0	17.1	68.0	79.1	61.3	79.8	10.67	26.12	....
1935	11.6	16.1	49.4	73.9	77.4	86.4	10.57	35.56	....
1936	11.7	17.2	99.6	85.3	76.7	96.0	8.93	31.78	....
1937	11.1	19.9	88.3	91.8	94.8	107.1	10.36	30.24	....
1938	8.3	17.2	55.5	76.9	49.0	66.1	7.55	21.13	....
1939	8.7	15.4	68.1	75.4	47.6	63.6	6.95	22.17	....
1940	9.6	16.0	70.7	85.2	59.0	73.9	7.62	24.31	....
1941	13.3	26.4	64.6	94.4	64.3	84.0	8.10	35.04	....
1942	18.51	36.9	110.0	108.3	79.5	101.8	10.05	44.42	....
1943	19.84	40.5	149.2	196.7	102.7	127.3	12.82	48.26	....
1944	20.39	41.8	141.0	213.5	113.3	142.8	15.43	52.80	....
May	19.80	37.2	134.0	236.0	115.0	147.0	16.10	52.50	....
June	20.16	49.2	125.0	233.0	115.0	143.0	15.00	52.80	....
July	20.32	45.0	138.0	230.0	117.0	139.0	13.90	53.00	....
August	20.15	39.3	159.0	258.0	117.0	135.0	14.30	53.20	....
September	21.02	42.9	147.0	219.0	116.0	135.0	14.70	52.30	....
October	21.25	41.2	142.0	185.0	113.0	142.0	15.20	52.70	....
November	20.78	45.1	143.0	164.0	106.0	143.0	15.60	53.40	....
December	20.85	43.5	150.0	175.0	106.0	145.0	16.50	53.10	....
1945									
January	20.20	41.9	158.0	190.0	107.0	146.0	17.10	52.80	....
February	19.99	31.8	165.0	201.0	106.0	147.0	17.70	52.70	....
March	20.24	21.4	171.0	207.0	107.0	148.0	18.10	52.00	....
April	20.20	21.4	174.0	211.0	107.0	149.0	16.90	51.90	....
May	20.51	42.2	177.0	214.0	108.0	149.0	16.50	52.10	....
Index Numbers (1910-14 = 100)									
1920	259	166	358	201	223	255	178	240	....
1921	99	187	149	136	91	135	109	103	....
1922	152	219	139	120	90	117	98	162	....
1923	215	183	121	119	124	112	103	202	....
1924	223	183	125	156	141	126	111	177	159
1925	178	161	164	196	154	172	105	162	153
1926	122	172	267	178	108	154	109	126	143
1927	128	199	190	130	122	137	101	132	121
1928	150	192	119	128	138	129	89	174	159
1929	143	179	135	135	135	117	97	162	149
1930	100	124	179	132	120	92	95	122	140
1931	61	79	104	106	77	55	82	79	117
1932	47	101	62	65	43	44	63	45	102
1933	65	124	95	68	56	66	57	57	105
1934	97	164	98	90	95	91	89	121	004
1935	94	155	71	84	119	98	89	165	126
1936	94	165	143	97	118	109	75	147	113
1937	90	191	127	105	146	122	87	140	122
1938	67	165	80	88	76	75	63	98	101
1939	70	148	98	86	73	72	58	103	109
1940	78	154	102	97	91	84	64	126	121
1941	107	254	93	108	99	95	68	162	145
1942	149	355	158	124	123	116	84	206	199
1943	160	389	214	225	158	145	107	224	245
1944	165	402	203	244	175	162	129	245	217
May	160	358	193	269	177	167	135	243	217
June	163	473	180	266	177	163	126	245	245
July	164	433	198	263	181	158	116	245	236
August	163	378	228	295	181	153	120	246	253
September	170	413	211	250	179	153	123	242	239
October	171	396	204	211	174	161	127	244	192
November	168	434	205	187	164	163	131	247	188
December	168	418	216	200	164	165	138	246	228
1945									
January	163	403	227	217	165	166	143	245	262
February	161	306	237	229	164	167	148	244	228
March	163	206	246	236	165	168	152	241	203
April	163	206	250	241	165	169	142	240	259
May	165	406	254	244	167	169	138	241	193

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.70	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.69	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
1943	1.75	1.42	6.30	5.77	3.34	4.86	6.62
1944	1.75	1.42	7.68	5.77	3.34	4.86	6.71
May	1.75	1.42	7.81	5.77	3.34	4.86	6.71
June	1.75	1.42	7.81	5.77	3.34	4.86	6.71
July	1.75	1.42	7.81	5.77	3.34	4.86	6.71
August	1.75	1.42	7.81	5.77	3.34	4.86	6.71
September	1.75	1.42	7.81	5.77	3.34	4.86	6.71
October	1.75	1.42	7.81	5.77	3.34	4.86	6.71
November	1.75	1.42	7.81	5.77	3.34	4.86	6.71
December	1.75	1.42	7.81	5.77	3.34	4.86	6.71
1945							
January	1.75	1.42	7.81	5.77	3.34	4.86	6.71
February	1.75	1.42	7.81	5.77	3.34	4.86	6.71
March	1.75	1.42	7.81	5.77	3.34	4.86	6.71
April	1.75	1.42	7.81	5.77	3.34	4.86	6.71
May	1.75	1.42	7.81	5.77	3.34	4.86	6.71
Index Numbers (1910-14 = 100)							
1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	146	129	139
1927	112	79	145	166	143	128	162
1928	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	12	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	131
1937	61	46	140	132	120	120	122
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
1943	65	50	180	163	110	144	189
1944	65	50	219	163	110	144	191
May	65	50	223	163	110	144	191
June	65	50	223	163	110	144	191
July	65	50	223	163	110	144	191
August	65	50	223	163	110	144	191
September	65	50	223	163	110	144	191
October	65	50	223	163	110	144	191
November	65	50	223	163	110	144	191
December	65	50	223	163	110	144	191
1945							
January	65	50	223	163	110	144	191
February	65	50	223	163	110	144	191
March	65	50	223	163	110	144	191
April	65	50	223	163	110	144	191
May	65	50	223	163	110	144	191

Wholesale Prices of Phosphates and Potash**

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Kainit 20% bulk, per unit, c.i.f. Atlantic and Gulf ports
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.525	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	15.17	.572	.623
1939	.478	.190	5.50	.521	.751	24.52	.570	.670
1940	.516	.190	5.50	.517	.730	24.75	.573	....
1941	.547	1.94	5.64	.522	.780	25.55	.570	....
1942	.600	2.13	6.29	.522	.810	25.74	.205	....
1943	.631	2.00	5.93	.522	.786	25.35	.195	....
1944	.645	2.10	6.10	.522	.777	25.35	.195	....
May	.640	2.00	6.10	.535	.797	26.00	.200	....
June	.640	2.00	6.10	.471	.701	22.88	.176	....
July	.646	2.16	6.10	.503	.749	24.44	.188	....
August	.650	2.20	6.10	.503	.749	24.44	.188	....
September	.650	2.20	6.10	.503	.749	24.44	.188	....
October	.650	2.20	6.10	.535	.797	26.00	.200	....
November	.650	2.20	6.10	.535	.797	26.00	.200	....
December	.650	2.20	6.10	.535	.797	26.00	.200	....
1945								
January	.650	2.20	6.10	.535	.797	26.00	.200	....
February	.650	2.20	6.13	.535	.797	26.00	.200	....
March	.650	2.20	6.20	.535	.797	26.00	.200	....
April	.650	2.20	6.20	.535	.797	26.00	.200	....
May	.650	2.20	6.20	.535	.797	26.00	.200	....
Index Numbers (1910-14 = 100)								
1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	110	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	102	87	....
1941	102	54	110	73	82	106	87	....
1942	112	59	129	73	85	106	84	....
1943	117	55	121	73	82	105	83	....
1944	120	58	125	73	82	105	83	....
May	119	55	125	75	84	108	83	....
June	119	55	125	66	74	95	80	....
July	121	60	125	70	79	101	82	....
August	121	61	125	70	79	101	82	....
September	121	61	125	70	79	101	82	....
October	121	61	125	75	84	108	83	....
November	121	61	125	75	84	108	83	....
December	121	61	125	75	84	108	83	....
1945								
January	121	61	125	75	84	108	83	....
February	121	61	126	75	84	108	83	....
March	121	61	127	75	84	108	83	....
April	121	61	127	75	84	108	83	....
May	121	61	127	75	84	108	83	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	143	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935.....	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	150	94	57	160	117	77
1944.....	195	176	151	96	57	174	120	76
May.....	194	175	152	97	57	175	119	78
June.....	193	176	151	95	57	175	119	69
July.....	192	176	152	96	57	175	121	74
August....	193	176	151	96	57	175	121	74
September.	192	176	151	96	57	175	121	74
October...	194	176	152	97	57	175	121	78
November.	196	177	152	97	57	175	121	78
December..	200	178	152	97	57	175	121	78
1945								
January...	201	179	153	97	57	175	121	78
February..	199	179	153	97	57	175	121	78
March....	198	180	153	97	57	175	121	78
April.....	203	180	154	97	57	175	121	78
May.....	200	180	154	97	57	175	121	78

* U. S. D. A. figures.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

**** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizer

"Effect of Fertilizers, Soil Reaction and Texture, and Plant Stand on the Performance of Strawberries," Agr. Exp Sta., Univ. of Ark., Fayetteville, Ark., Bul. 454, March 1945, J. R. Cooper and J. E. Vaile.

"Commercial Fertilizer Sales As Reported to Date for the Quarter Ended March 31, 1945," Bu. of Chem., Dept. of Agr., Sacramento 14, Calif., FM-108, May 17, 1945.

"Agricultural Mineral Sales as Reported to Date for Quarter Ended March 31, 1945," Bu. of Chem., Dept. of Agr., Sacramento 14, Calif., FM-109, May 17, 1945.

"Supplementary Fertilizer Recommendations for Spring 1945," Advisory Fert. Board, Guelph, Ont., Can., Dec. 1944.

"Availability of the Phosphorus of Various Types of Phosphates Added to Everglades Peat Land," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 408, March 1945, J. R. Neller.

"1944-45 Fertilizer Recommendations for Georgia," Agr. Ext. Serv., Athens, Ga., Nov. 30, 1944.

"Commercial Fertilizers," Ga. Dept. of Agr., Atlanta, Ga., Serial No. 129, Jan. 1945.

"Fertilizer Recommendations of the Louisiana Agricultural Experiment Station for Field and Pasture Crops," Agr. Exp. Sta., Agron. Dept., Baton Rouge, La., May 1945, M. B. Sturgis.

"Commercial Feeds, Fertilizers and Agricultural Liming Materials," State Insp. & Regulatory Serv., College Park, Md., No. 193, C. S., Jan. 1945.

"Fertilizers and Manure in the Improvement and Maintenance of Soil Productivity in Southern Nevada," Agr. Exp. Sta., Univ. of Nev., Reno, Nev., Bul. 171, Sept. 1944, Geo. Hardman.

"Fertilizer Sales in Ohio in 1944," Dept. of Agron., Ohio State Univ., Columbus, Ohio.

"Fertilizing Wheat for Yield and Quality," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Bul. 285, May 1945, H. F. Murphy.

"Field Experiments with Phosphatic Fertilizers," Agr. Exp. Sta., Va. Polytechnic Inst., Blacksburg, Va., Bul. 364, Nov. 1944, R. E. O'Brien.

"Lime and Fertilizers in Relation to Blackspot of Roses," Agr. Exp. Sta., Va. Polytechnic Inst., Blacksburg, Va., Bul. 368, March 1945, A. G. Smith, Jr.

"The Value of Liquid Manure for Pasture," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bul. 457, Jan. 1945, F. B. Wolberg, A. A. Spielman, and V. L. Miller.

"Explosibility and Fire Hazard of Ammonium Nitrate Fertilizer," U.S.D.A., Washington, D. C., Cir. 719, March 1945, R. O. E. Davis.

Soils

"Use Soil Conservation to Increase Production on Your Farm," Ext. Serv., Univ. of Ark., Fayetteville, Ark., Leaf. 47, Rev. 1945.

"Soil Reaction (pH)," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Press Bul. 606, Dec. 1944, G. M. Volk.

"Review of Principal Results, 1944," U.S. D.A., S.C.S., Southern Piedmont Cons. Exp. Sta., Watkinsville, Ga., May 1, 1945, B. H. Hendrickson, J. R. Carreker, and W. E. Adams.

"Physical Land Conditions in Kent Soil Conservation District, Maryland," U.S.D.A., Washington, D. C., Phys. Land Survey No. 37, 1945, Ralph W. Ruble.

"A Guide to Conservation Practices for Ohio," War Foods Adm., A. A. A., Washington, D. C., AIS-16, April 1945.

"Soil Survey, Huntingdon County, Pennsylvania," U.S.D.A., Washington, D. C., Ser. 1934, No. 27, Dec. 1944, H. W. Higbee, S. R. Bacon, R. T. A. Burke, A. L. Patrick, L. A. Brown, N. P. Tedrow, R. S. Long, and C. H. Atkinson.

"Soil Survey, Kittitas County, Washington," U.S.D.A., D. C., Ser. 1937, No. 13, Jan. 1945, L. H. Smith, C. H. Dwyer, and Geo. Schafer.

Crops

"A Year Around Feed and Forage Cropping System for Cattle in the Piedmont and Upper Coastal Plain Regions," Agr. Exp. Sta., Ala. Polytechnic Inst., Auburn, Ala., Mimeo Ser. No. 7, Rev. Feb. 1945, J. C. Grimes.

"Pruning, Thinning and Utilizing Trees," Exp. Farms Serv., Dept. of Agr., Ottawa, Canada, Publ. 770, Circ. 176, March 1945, John Walker.

"Guide to Crop Production in Ontario," Ont. Dept. of Agr., Statistics & Publ. Branch, Toronto, Can., Cir. 68, March 1945.

"Addresses and Proceedings, Potato Section, Ontario Crop Improvement Association," Ont.

Dept. of Agr., Crops, Seeds, & Weeds Branch, Toronto, Ont.

"Addresses, Annual Convention, Ontario Crop Improvement Association," Ont. Dept. of Agr., Crops, Seeds, and Weeds Branch, Toronto, Can., Feb. 5, 1945.

"The Effect of Planting Dates on the Yield of Triumph and Red McClure Potatoes in the San Luis Valley," Agr. Exp. Sta., Colo. A. & M. College, Fort Collins, Colo., Press Bul. 99, March 1945, John G. McLean.

"Germination of Hawaiian Range Grass Seeds," Agr. Exp. Sta., Univ. of Hawaii, Honolulu, T. H., Bul. No. 2, Oct. 1944, Ernest K. Akamine.

"Biennial Report of the Commissioner of Agriculture," Dept. of Agr., Hartford, Conn., Public Doc. No. 18, June 30, 1944.

"Tree Conditioning the Peach Crop . . . ," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Bul. 507, Dec. 1944, M. J. Dorsey and R. L. McMunn.

"Yields of Winter Wheat 1943-44," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Cir. 588, Feb. 1945, G. H. Dungan and O. T. Bonnett.

"Directions for Replicated Hybrid Corn Test," Agr. Ext. Serv., Purdue Univ., Lafayette, Ind., Agron. Mimeo. 51.

"Sunflowers Under Indiana Conditions," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Agron. Mimeo. 53, Feb. 1945.

"Report on Agricultural Research for the Year Ending June 30, 1944, Part I," Agr. Exp. Sta., Ia. State College, Ames, Ia.

"Report on Agricultural Research for the Year Ending June 30, 1944, Part II," Agr. Exp. Sta., Ia. State College, Ames, Ia.

"Testing Farm Seed," Agr. Exp. Sta., Ia. State College, Ames, Ia., Bul. P68, Sept. 1944, R. H. Porter.

"The 1944 Iowa Corn Yield Test," Agr. Exp. Sta., Ia. State College, Ames, Ia., Bul. P71, Feb. 1945, Francis Reiss and Joe L. Robinson.

"Testing the Quality of Seeds for Farm and Garden," Agr. Exp. Sta., Ia. State College, Ames, Ia., R. Bul. 334, Dec. 1944, R. H. Porter.

"What About Balbo Rye?" College of Agr., Univ. of Ky., Lexington, Ky., A. Mim. 129, July 1944, W. C. Johnstone.

"The Identification of Pear Varieties from Non-Bearing Trees," Agr. Exp. Sta., Mass. State College, Amherst, Mass., Bul. 421, Nov. 1944, L. Southwick, A. P. French and O. C. Roberts.

"The Home Vegetable Garden," Ext. Serv., Mich. State College, East Lansing, Mich., E. Bul. 4 (Rev.) March 1945, P. R. Krone, Ray Hutson, H. C. Moore, J. H. Muncie, and James Tyson.

"Michigan's 1945 Crops Program," Ext. Serv., Mich. State College, East Lansing, Mich., E. Fold. F-68 (Rev.), Jan. 1945.

"Minhybrid Corn Varieties for Minnesota," Agr. Exp. Sta., Univ. of Minn., St. Paul, Minn., Bul. 354, Rev. June 1944, E. H. Rinke, H. K. Hayes, Y. S. Tsiang, and Carl Borgeson.

"Improved Varieties of Farm Crops," Agr. Ext. Serv., Univ. of Minn., St. Paul, Minn., E. Fold. 22, Rev. April 1945.

"Establishment and Early Management of the Vineyard," Agr. Ext. Serv., Univ. of Mo., Columbia, Mo., Cir. 512, Dec. 1944, W. R. Martin, Jr., H. G. Swartwout, and M. W. Clark.

"Nebraska Outstate Crops and Soils Tests, Variety Test for 1944," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., Bul. 372, Feb. 1945, G. T. Webster.

"New Jersey Agriculture, Historical Facts and Figures," State Dept. of Agr., Trenton 8, N. J. Cir. 339, May 1, 1945.

"Grape Production in New York," State College of Agr., Cornell Univ., Ithaca, N. Y., Bul. 375, Aug. 1937 (Rev. Oct. 1944), M. B. Hoffman.

"Potato Growing in New York," State College of Agr., Cornell Univ., Ithaca, N. Y., Bul. 667, Jan. 1945, E. V. Hardenburg.

"Hay-Crop Silage, A Summary of Ten Years' Work," Agr. Exp. Sta., Wooster, Ohio, Bul. 656, March 1945, C. C. Hayden, A. E. Perkins, C. F. Monroe, W. E. Krauss, R. G. Washburn, and C. E. Knoop.

"Experiments in Growing Tomatoes for Canning," Agr. Exp. Sta., Wooster, Ohio, Bul. 657, April 1945, John Bushnell.

"Choosing and Sowing Meadow and Pasture Seedings," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, Bul. 261, March 1945.

"Mungbeans, A Legume for Seed and Forage Production," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Bul. 284, May 1945, L. L. Ligon.

"Community Test Plot Results, Oklahoma Farm Wheat Improvement Program 1943-44 Crop," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Mimeo. Cir. M-129, Aug. 1944, Roy M. Oswalt.

"Range and Pasture Studies and Grazing Recommendations for the Southern Great Plains," Panhandle A. & M. College, Goodwell, Okla., Bul. 67, June 1944, W. N. McMillen and Quentin Williams.

"The Control of Wind Erosion by the Establishment of Turf Under Airport Conditions," Agr. Exp. Sta., R. I. State College, Kingston, R. I., Bul. 295, Jan. 1945, R. S. Bell and J. C. F. Tedrow.

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"Sweet Potato Plant Production," Clemson Agr. College, Clemson, S. C., Cir. 268, Feb. 1945, C. J. Nusbaum, W. C. Nettles, and J. A. Berly.

"Growing Strawberries," Ext. Serv., S. D. State College, Brookings, S. D., Leaf. 90, March 1944, S. A. McCrory.

"Some Vegetable Varieties for Vermont,"

Ext. Serv., Univ. of Vt., Burlington, Vt., Brief. 716, April 1945, C. H. Blasberg.

"Orfed Wheat," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bul. 451, Sept. 1944, O. A. Vogel, S. P. Swenson, and C. S. Holton.

"Reseeding West Virginia Pastures," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Mimeo. Cir. 50, Feb. 1945, R. M. Smith and G. G. Pohlman.

"Meadow and Pasture Mixtures for West Virginia," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Mimeo. Cir. 51, Feb. 1945, G. G. Pohlman.

"The Limitations of Spraying Tomatoes in Wisconsin," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., R. Bul. 152, Oct. 1944, J. C. Walker, O. C. Whipple, J. P. Jolivette and W. J. Hooker.

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"Commercial Cabbage Culture," U.S.D.A., Washington, D. C., Cir. 252, Jan. 1933 (Rev. Jan. 1945), Victor R. Boswell.

"Growing Sweet Corn for the Cannery," U.S.D.A., Washington, D. C., F. Bul. 1634, March 1945, J. H. Beattie.

"Seasonal Changes in Florida Grapefruit," U.S.D.A., Washington, D. C., T. Bul. 886, April 1945, Paul L. Harding and D. F. Fisher.

Economics

"Canadian Agricultural Program for 1945," Dom. Dept. of Agr., Agr. Supplies Bd., Ottawa, Can., Jan. 15, 1945.

"Connecticut Vegetable Industry and Its Outlook for 1945," Dept. of Agr., Bu. of Markets, Hartford, Conn., Bul. 88, April 1945.

"Farming Opportunities in Idaho," Agr. Exp. Sta., Univ. of Idaho, Moscow, Idaho, Bul. 258, Nov. 1944, P. A. Eke and Karl Hobson.

"Design and Statistical Analysis of Some Confounded Factorial Experiments," Agr. Exp. Sta., Ia. State College, Ames, Ia., R. Bul. 333, June 1944, Jerome C. R. Li.

"Wartime Farm and Food Policy, Agricultural Prices After the War," Ia. State College Press, Ames, Ia., Pamph. II, 1945, Geoffrey Shepherd.

"Opportunities in Kentucky Agriculture," Agr. Ext. Div., Univ. of Ky., Lexington, Ky., Cir. 404, Feb. 1945.

"Costs and Practices in Producing Potatoes in Southern Aroostook County, Maine, 1941," Agr. Exp. Sta., Univ. of Me., Orono, Me., Bul. 432, Dec. 1944, W. E. Schrumpf.

"Farm Management Chart Book 1945," Agr. Exp. Sta., Mich. State College, East Lansing, Mich., F.M. 360, Jan. 1945, K. T. Wright and B. R. Bookhout.

"Sales of Minnesota Agricultural Products," Agr. Exp. Sta., Univ. Minn., St. Paul, Minn.. Bul. 384, April 1945, Warren C. Waite.

"We Could Prevent Land Price Inflation in Missouri," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 298, March 1945, O. R. Johnson.

"Farmers Measure Up," Agr. Exp. Serv., Univ. of Mo., Columbia, Mo., Cir. 515, Feb. 1945, J. W. Burch.

"Buying a Farm in New York," State College of Agr., Cornell Univ., Ithaca, N. Y., Bul. 412, June 1939 (Rev. Jan. 1945), Howard S. Tyler.

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"Handbook for Agricultural Workers," Agr. Ext. Serv., N. C. State College, Raleigh, N. C., 1945.

"Marketing Fruits and Vegetables in Utah," Agr. Exp. Sta., State Agr. College, Logan, Utah, Bul. 316, March 1945, W. P. Thomas and G. T. Blanch.

"Range Lands of Utah County and Their Utilization," Agr. Exp. Sta., State Agr. College, Logan, Utah, Bul. 317, March 1945, L. A. Stoddart.

"A Study of the Agricultural Production Program in Utah for Post-War Period," Agr. Exp. Sta., State Agr. College, Logan, Utah, Mimeo Ser. 313, Nov. 1944.

"Food Needs for 1945," Agr. Ext. Serv., Blacksburg, Va., Bul. 164, Dec. 1944, J. R. Hutcheson.

"An Economic Study of Agriculture in Western Washington in Relation to Economic Land Class," Agr. Exp. Sta., State College of Wash., Pullman, Wash., A.E. 5, Aug. 1944, A. W. Peterson, B. D. Parrish, and M. T. Buchanan.

"Some Questions to Ask When Buying a Farm," Ext. Serv., College of Agr., Madison, Wis., Cir. 347, Sept. 1944, W. W. Wilcox and P. E. McNall.

"If You Have to Borrow Money When Buying a Farm," Ext. Serv., College of Agr., Madison, Wis., Cir. 348, Sept. 1944, K. H. Parsons.

"Some Legal Safeguards to Take When Buying a Farm," Ext. Serv., College of Agr., Madison, Wis., Cir. 349, Sept. 1944, Miles C. Riley.

"AAA Handbook of Conservation Practices: Ala., Ark., Fla., Ga., La., Miss., Okla., S. C., and Texas," War Food Adm. Southern Div., Washington, D. C., SRB-901, April 1945.

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"The Work of the U. S. Forest Service," U.S.D.A., Washington, D. C., Mis. Publ. 290, Rev. Jan. 1945.

"Prices Received by Growers for Fruit and Nut Crops by Type of Sale and Utilization Groups, U.S.D.A., Washington, D. C., Nov. 1943 (Rev. Jan. 1945).

"Flaxseed—Production, Farm Disposition, and Value, by States, 1909-41," U.S.D.A., Washington, D. C., Jan. 1945.

"Production and Consumption of Vegetables, United States 1909-43," U.S.D.A., Washington, D. C., Dec. 1944.

"Published Information on Foreign Agriculture," Office of Foreign Agr. Relations, U.S.D.A., Washington, D. C., Jan. 1945.

"The Food Situation and Outlook in Continental Europe, the Mediterranean Area, and the Soviet Union," Office of Foreign Agr. Relations, U.S.D.A., Washington, D. C., May 1, 1945.

"Wartime Changes in World Food Production," Office of Foreign Agr. Relations, U.S.D.A., Washington, D. C., Dec. 1944, C. M. Purves.

Soil Gains in Nitrogen from Alfalfa Crop

THE important part that alfalfa plays in putting nitrogen back into the soil and what this element means in terms of fertilizer to the grower when the crop is fed to livestock on the farm were recently cited by H. J. Snider, assistant chief, soil experiment fields, University of Illinois College of Agriculture.

The agronomist reported that a four-ton yield of alfalfa was found to contain an average of 220 pounds of nitrogen, 14.4 pounds of phosphorus, 100 pounds of potassium, and approximately 500 pounds of limestone. As a legume crop, alfalfa takes only about one-third of its nitrogen from the soil and two-thirds from the atmosphere. This allows a gain of 147 pounds of nitrogen in four tons of hay.

With only one-third of the nitrogen in alfalfa taken from the soil, Snider points out that this would mean a removal of 18 pounds of nitrogen, 3.6 pounds of phosphorus, 25 pounds of potassium, and about 125 pounds of limestone by each ton of hay.

At present prices for fertilizers these elements might be replaced at a cost of about $4.00, which represents the amount of soil fertility loss for each ton of alfalfa sold from the farm.

Snider observes that when a ton of hay is sold the two-thirds, or 37 pounds, of nitrogen obtained from the air goes with no gain to the grower, but rather as a gain to the buyer of the hay. But when alfalfa is fed on the farm where it is grown and the manure is returned to the land, there would be a large gain in nitrogen and the phosphorus and potassium loss would be greatly lessened.

What Affects Vitamin Content of Crops?

AFTER 18 months of analytical research with vegetables growing in various soil types and under varying fertilization and climatic conditions, Dr. Byron E. Janes of the Florida Agricultural Experiment Station has come to the conclusion that any well-grown vegetable will contain normal amounts of vitamins.

In his research, the Florida horticulturist made analyses for vitamins A and C of cabbage, beans, tomatoes, collards, and broccoli that were grown in eight widely separated locations in Florida, and his results showed that they compared very favorably with those grown in other parts of the country.

He found that vitamin values of vegetables vary with varieties, with some ranking slightly lower than others (variety is not as important as other factors in influencing vitamin content), that they vary with locations and soil types, and with fertilization, temperature, rainfall, and other climatic conditions.

One vegetable's vitamin content may be higher in one location than the same vegetable grown in another, but the vitamin content of other vegetables

grown in the two sections would not necessarily be in the same ratio, Dr. Janes discovered. He explained this point by showing that the location which produced cabbage of the highest vitamin C content produced beans of the lowest C content.

Temperature, light, rainfall, and other climatic conditions affect the vitamin content of vegetables, and as these vary each year, the vitamin contents of the vegetables also vary.

Dr. Janes found that the effect of fertilizer on vitamin content of vegetables is not nearly as great as the effect of location. The C content of cabbage and broccoli that were heavily fertilized was slightly lower than that of the same vegetables that received less fertilizer; the C content of collards was much lower, and the A content of collards and broccoli was raised by heavy fertilization.

His research showed that fertilizer does not materially affect the vitamin content of an individual vegetable, but it does materially increase the vitamin value of the whole crop in that it increases the yield.—CLYDE BEALE, *Agricultural Extension Service, Gainesville, Florida.*

To Produce Best Soybean Yields

THE remarkable ability of soybeans to produce a fair crop on land of moderate or even low fertility gives the impression that the crop is an "easy keeper" and does not need much fertilizing nutrients.

However, L. B. Miller, assistant chief in soil experiment fields, University of Illinois College of Agriculture, points to chemical analyses to disprove this general belief. He reports that a 30-bushel crop of soybeans removes almost as much phosphorus, twice as much potash, and five times as much lime as an 80-bushel corn crop. Facts like these, he says, show how soybeans draw upon the mineral supply in the soil.

Experiments have indicated the soybean response to fertilization. Miller points out that as far as phosphate is concerned there have been few significant responses except on soils which were extremely deficient in this nutrient. On soils which are moderately deficient in potassium, the use of muriate of potash, or of a mixed fertilizer rich in potassium, has given fairly good results. The material may be either broadcast or drilled at planting time, but direct contact with the seed beans should be avoided.

If soil tests show a deficiency of the plant nutrients, Miller says that studies show it is good business to apply enough fertilizer at one time to take care of the needs of all crops in the rotation.

A soybean-corn rotation is not recommended although many farmers follow this plan. In such cases farmers should apply fertilizer, as this rotation system uses up minerals and organic matter at a rapid rate which quickly depletes the soil. Fields that have been farmed with corn and soybeans may respond moderately to the use of fertilizers directly on soybeans, but the continuation of this rotation, even with the use of fertilizer, is almost sure to result in a lower productivity level of the soil because it will be gradually depleted of organic matter and nitrogen.

The speed with which the soybean crop has come into general use in the Corn Belt is almost unbelievable, Miller asserts. The first year in which more than 100,000 acres were harvested for grain in Illinois was in 1924. Twenty years later, in 1944, more than 35 times as many acres, or nearly 4,000,000, were grown for grain. Several hundred thousand additional acres were grown for hay. This acreage represents about one-half the normal corn acreage for the State.

Paid Out in Advance

MORE than a thousand borrowers from the Farm Security Administration have repaid their 40-year farm ownership loans in only three to seven years time, and now own their farms debt-free. They are among the more than 37,000 families throughout the country who have bought farms with FSA loans since the agency's farm ownership program started late in 1937. Such loans carry 3 per cent interest and may run for as long as 40 years. Most borrowers use the "variable payment plan," repaying more in years of good income and less in "bad" years.

South Carolina Experts Tell How to Grow Cotton

(*From page* 18)

in picking, handling, or storage. 3. Keep good and bad cotton separate. 4. Damp or green cotton must be properly dried before it is ginned. Green or wet cotton should be stirred daily until dry. Avoid over-drying, which would hurt the fiber. Four hours of sun-drying should be sufficient for average farm drying. 5. Try to make standard weight bales—450 to 550 pounds. 6. Protect baled cotton and seed cotton from damage.

The first recommendation for the ginners is to put their gin in proper order by repairs and replacements to defective machinery items such as saws, ribs, interior parts, doffers, bearings, etc. They should modernize their gins by speeding up the saw to 650-700 R.P.M., and putting in extractor feeders and driers.

The next suggestion is to operate the gin properly by keeping drying temperature between 150° and 160° Fahr., and also to gin with loose seed roll and feed 1⅛" and longer cotton at slower rate than short staple cottons.

NOTE: Members of the Extension committee presenting this information on how to produce the largest profitable yields of cotton per acre are: H. G. Boylston, assistant extension agronomist, chairman; W. H. Craven, extension agronomist; D. R. Hopkins, county agent; J. M. Napier, extension AAA agent, and W. C. Nettles, extension entomologist.

Others contributing to the recommendations of the Committee were: Dr. George J. Wilds, president, Coker's Pedigreed Seed Company; D. M. Lipscomb, secretary, South Carolina Cotton Seed Crushers Association; Dr. H. P. Cooper and E. E. Hall, South Carolina Experiment Station; J. M. Eleazer, L. B. Massey, and A. H. Ward, Extension Service.

Boron Content of Mississippi Soils and Plants

(*From page* 13)

In the greenhouse the weight of the cotton or corn plants was not increased by applications of borax to the soil, although the available boron in the soil and the boron content of the plants were increased. The greenhouse results give no indication as to how borax may have affected the yield of seed cotton or corn, but they do show that where borax was applied to the soil the plants absorbed much more boron than where borax was not applied.

Results from the field and greenhouse experiments show an excellent correlation between the amount of boron applied, the amount of available boron in the soil, and the amount of boron absorbed by plants. The results indicate that the Berger-Truog method is an excellent way to determine the available boron in the soil and the total boron in the plant.

TABLE 2.—EFFECT OF BORON APPLICATIONS UPON THE BORON CONTENT OF SOILS AND PLANTS

A. Field Experiments

Treatment	Ruston sandy loam		Cahaba sandy loam	
	Available boron in soil	Boron in cotton plant	Available boron in soil	Boron in cotton plant
Lbs. per acre	p. p. m.	p. p. m.	p. p. m.	p. p. m.
No borax	0.65	11.5	0.63	17.5
10 lbs. borax	0.70	19.0	0.75	28.8
No borax—2,000 lbs. lime	0.48	8.0	.....	.....
10 lbs. borax—2,000 lbs. lime	0.60	16.5	.....	.....

B. Greenhouse Experiments

Treatment*	Ruston sandy loam			Paden silt loam		
	Weight of corn plants	Available boron in soil	Boron in corn plants	Weight of cotton plants	Available boron in soil	Boron in cotton plants
Lbs. per acre	gms./pot	p. p. m.	p. p. m.	gms./pot	p. p. m.	p. p. m.
No borax	41.1	0.80	5.0	30.3	0.55	4.8
10 lbs. borax	36.1	0.88	16.0	25.0	0.88	12.5
No borax—2,000 lbs. lime	51.0	1.03	11.0	29.6	0.88	24.0
20 lbs. borax	39.1	1.15	19.5	24.7	1.10	37.8
50 lbs. borax	38.3	1.18	29.5	18.7	1.33	42.5

* All pots received 600 lbs. of 6–8–8 per acre.

Selective Service for Each Acre

(*From page* 26)

for no small part of the increased production and promises even greater and more permanent agricultural gains.

An important phase of our future agricultural problem will be the production of additional income-producing crops to supplement income from cotton and tobacco. New sources of income must come through changes in the use of the land. Since soil conservation is based on the principle of using all land on each farm according to its capabilities and treating it according to its needs, new sources of income may be expected on farms where soil conservation district programs are established.

That this can be done without sacrifice of production has been admirably proven by countless farmers throughout the South. Reports of significant results have been received from 5,261 farmers operating 1,742,323 acres of land in 13 Southern states. These farmers are from the group of 162,550 cooperators with soil conservation districts utilizing the technical assistance of the Soil Conservation Service and other aids. Their changes in land use and production are based on averages of 2 to 4 years prior to, and a similar

period following, the establishment of 70 to 100 per cent of the planned soil conservation practices.

Cropland changed from 669,543 to 641,992 acres. Average decrease 4.1%. (Decrease by states from 0.1% in Arkansas to 13.7% in Florida.)

Grazing land changed from 811,468 to 910,303 acres. Average increase 12.1%. (Increase ranging from approximately 40% in the Southeast to 4% in Texas.)

Idle land changed from 61,697 to 5,356 acres. Average decrease 91.3%. (Decrease by states from 54.9% in Kentucky to 99.8% in Florida.)

Cotton acreage was reduced, average 19.6%. (Reduced by states from 6.5% in Mississippi to 38.1% in Florida.) Production per acre increased, average 32.8%. (Increase by states from 25% in Texas to 102.2% in Virginia.) Total number of bales produced on these farms increased an average of 6.7%. (Change by states from decrease of 2.1% in Alabama to increase 43% in Louisiana.)

Corn acreage was reduced, average 15.1%. (From a decrease of 30.5% in Alabama to an increase of 22.7% in Florida.) Production per acre increased 39.2%. (From 27% in Texas to 62.6% in Virginia.) Total number of bushels produced on these farms increased 18%. (From 1.9% in Alabama to 73.5% in Florida.)

Wheat acreage was reduced 12.5%, production per acre increased 46.9%, and total number of bushels produced increased 27.7%.

Acres in legume hay increased 60.7%. (From 4.6% in Kentucky to 145.2% in Florida.) Total production increased 84.4%. (From 12.4% in Virginia to 180.1% in Alabama.) Acres in non-legume hay increased 12%, and total production increased 42% with Louisiana and Alabama leading the increase.

The following changes in livestock population occurred on these farms:

Dairy cattle increased 40.4% (From 15.3% Tennessee to 84.6% North Carolina).
Beef cattle increased 117.4% (From 14% Texas to 192.4% Georgia).
Brood sows increased 87.2% (From 6% Louisiana to 154.8% North Carolina).
Ewes increased 66.0% (From 16% Texas to 866.3% Alabama).
Chickens increased 76.6% (From 36% Louisiana to 201.9% Florida).
Turkeys increased 32.4% (From 8% Louisiana to 1108% Tennessee).

The Soil Conservation District Program means better, wiser, land use. It means increased sustained production. It means using all the acres on the farm, thus providing land for crops substituting for cotton. It means the basis for a permanent agriculture on land kept permanently productive. Soil and water conservation farming will not correct all the perplexing, economic ills of Southern agriculture, but without it, the ills particularly of the producer, and finally of the industry, must increase. It is fundamental, therefore, to any future progress.

Know Your Soil

(*From page* 10)

Phosphorus

The phosphorus requirement of the plant is about one third as much as nitrogen in actual weight, but there are more phosphate-deficient soils than there are nitrogen-deficient ones and still there is more phosphorus applied as commercial fertilizers. This is due to the fixation power of the soil. In other words, it is difficult to keep phosphorus available to the plants even though it is not leached from the soil. This fixation varies tremendously from soil to soil. Strongly acid soils fix in an unavailable state more phosphorus than properly limed soils; soils well supplied with organic matter fix less than soils poorly supplied, and red and yellow soils more than gray and brown soils. A thousand pounds of 5-10-10 fertilizer

will supply three times as much phosphorus as is needed for a 10-ton crop of tomatoes. However, many soils will require more phosphorus than that to produce 10 tons. To safeguard a crop from phosphorus deficiency, lime to about 80 per cent of the lime-holding capacity (pH 6.2 to 6.5), supply organic matter in abundant amounts, and use selected methods of applying the phosphorus, but above all find out if your soil is the type that has a high phosphate requirement. See Fig. 6.

Potash

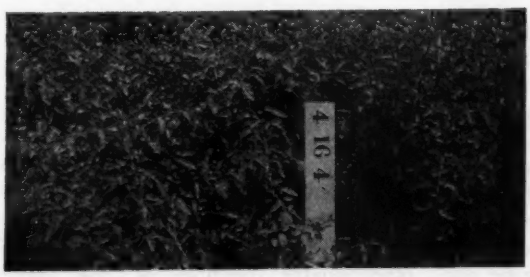
By far the largest amount of any of the plant foods needed by the plant is potash. Whereas 100 pounds of nitrogen and 35 pounds of phosphoric acid are used by 3,000 tomato plants, 200 pounds of potash are required for a 10-ton crop of tomatoes. While little over one-half of this is taken off the soil by the fruit, the total amount is required to produce the crop. Since most satisfactory crops produce from 15 to 20 tons of tomatoes (harvested 10 to 15 tons), it is readily seen that the use of adequate potash is necessary. Most of the soils in the eastern part of the United States are deficient in potash; therefore, it is necessary to supply a large part of it in commercial fertilizers. However, here again soil-improving crops in the crop rotation are important.

A knowledge of the amount of readily available potash in the soil can be learned from a quick analysis of the soil. A crop-producing program to maintain in an available state an adequate supply of potash can be established if one knows his soil conditions.

Summary and Conclusion

There is available a wealth of practical and scientific information about soils, but for a grower to succeed he must know his own soil. He must study this soil, find out when to plow it and how to plow it to get it into the best physical condition for the crop to be grown. He must learn the status of lime in the soil and know how much is needed to put the soil in an ideal condition for crop growth as well as how to apply it and when. He must know how much organic matter he has in his soil and whether his crop rotation is building or tearing down his supply. He must know how much nitrogen, phosphorus, and potash are required and how to apply them. The grower must get this information through a system of analyses of his soils, or through the hard way, by trial and error. Last, but not least, the grower must be open-minded and receptive to new ideas. He must study scientific information advanced and think about his conditions and see if he can apply the information to his farm and farming practices. In other words, he is the master of his own ship and where he steers it, it will land.

No phosphorus.



160 pounds phosphoric acid.

Fig. 6. Field tests, an essential method of finding the fertilizer requirements of the soil.

Gravel-Culture Tomatoes

(*From page* 20)

production period from November to July.

While gravel culture offers a speedy, sometimes preferable, growing method for production volume, carefully-fed soil-rooted plants present a highly profitable greenhouse crop, too. Again feeding of the plant is a major trick. The gravel culture method, however, dodges the majority of complicating hazards.

For example, in one section of the A. and M. greenhouse in a space 32 by 96 feet, 10 varieties of soil-anchored tomato plants are grown. They net an 8-ton yield during an 8-month growing period. Sold at 20 cents a pound to commercial dealers, barring waste, 8 tons stand for a maximum of $3,200 income for winter grown tomatoes.

Both methods require a plant-food basis.

Maximum yield in a minimum space, produced under the most favorable conditions possible, are the goals to which the Oklahoma specialists are striving. Laying no claim to establishing the process. they are focusing their special attention on gravel culture and giving the tomato an unlimited future.

Balanced Sods in Orchards

(*From page* 24)

seedings of Ladino clover in the College orchards where a few pounds of sweet clover seed were added. Where the sweet clover was clipped back when it got up to a foot high, it was non-competitive and seemed to greatly assist the Ladino clover.

6. Clipping the growth back with the mower bar set at four inches to leave a good ground cover and clipping frequently enough to control weed growth and to prevent the re-seeding of grasses at any time. When grasses are allowed to go to seed, from 100 to 400 pounds of seed to the acre go back on the soil. If only 10 per cent of these seeds grow, it is enough to discourage or smother any legume.

7. Permitting the Ladino clover to bloom freely in July and August and to reseed itself as an insurance policy against winter injury and freezing out in late winter and early spring. Data show that from 15 to 70 pounds of Ladino seed may be produced to the acre in a good stand where bees are present to work the blossoms. If this program is followed, the first purchase of Ladino clover seed may be the last. Hay cut in August when the heads are full of seed may be scattered and disced into the soil on other areas. This is like the seed-mulch method used on airfields. It is simple, cheap, and very effective because the hay greatly helps in establishing the seed by holding moisture and by keeping the soil cool and porous. This principle can be used with any grass or legume. With seeds as high in price as they are today, some growers may want to consider this plan rather seriously.

We have mentioned timothy and red fescue as being relatively non-competitive to Ladino clover. Neither is so aggressive as orchard grass which is objectionable because of the large clumps that develop with age. If orchard grass were not so bunchy, it would be outstanding because it is

such a good companion with Ladino clover where it is kept down by frequent clipping. One of its chief virtues is its shade-tolerance. Fortunately, red fescue is just as shade-tolerant as orchard grass and it develops a low smooth tough turf that will take plenty of punishment. Creeping red fescue is to be preferred over Chewings fescue because Chewings tends to be bunchy too, although both are neither so large nor so objectionable as orchard grass.

Timothy has the advantage of maturing seeds late in July so that there is more time to get it mowed before the seeds are ripe. The sod it makes is neither heavy nor tough but makes a good substantial cover. It is relatively non-competitive with Ladino clover.

Kentucky bluegrass does not produce a balanced sod with Ladino clover in Pennsylvania. It tends to smother the Ladino in about the second or third year under normal conditions. On rich soils, Kentucky bluegrass tends to come in of its own accord, probably from seeds that are in the soil. This is a natural occurrence that we can't do much about and don't intend to.

Canada bluegrass does not fit too well with Ladino clover because they have different adaptations. Canada bluegrass will do well on poor, thin, dry soils where Ladino cannot be expected to thrive. Otherwise, Canada bluegrass makes a low-growing tough sod that will take a lot of hard wear. We've sowed a lot of it in Ladino mixtures for poultry ranges and have yet to see much of it, so there is not much use seeding it in Ladino mixtures.

Other Legumes

We have mentioned birdsfoot trefoil but have not recommended it as an orchard legume. Because of some of its characteristics, it deserves some discussion and, in some orchards I have seen, birdsfoot would be a big advantage over the existing cover, if any. It is a drought-tolerant legume and it is a long-lasting perennial which reseeds itself each year at the rate of 40 to 60 pounds of seed to an acre. During extremely dry seasons I have observed that, under a heavy cover of birdsfoot, the soil stays quite moist. It has the distinct advantage of being able to compete successfully with tall-growing grasses, even though the cover is not mowed. It will grow on soils of low fertility and low organic matter better than Ladino clover. The root system is much more branched and fibrous than alfalfa and it is believed to require less moisture than alfalfa so that it should not compete seriously with the trees for moisture in a dry season. It will grow better in a balanced sod with more of the grasses than Ladino clover. With Canada bluegrass it looks like a "natural." Some of its disadvantages include: (1) difficulty of establishment, (2) taking two to three years to become fully established. Special birdsfoot inoculant is an absolute requirement, and I have found through experience that it pays to double-inoculate with commercial inoculant and also with soil from old established plants. Lime and fertilizer requirements are lower than for Ladino but it responds to good treatment. A very important factor is to seed the very minimum of grass with the birdsfoot and also to destroy the existing cover completely so as to permit the seedlings to start with the least possible competition. So far as adaptation is concerned, I have seen it growing successfully from Nebraska to New Jersey and from Pennsylvania to Canada through the Northeast. Five pounds of seed to the acre are recommended for good stands, but good catches have been obtained with two pounds if all conditions are favorable. It can be seeded in July or in late winter on honeycombed soil.

I shall say very little about crown vetch except that it looks very promising. Some demonstration plots of this legume have been established in the past few years. The fact remains that no seed is available commercially but plenty of root-crowns are available for the digging. It grows well and competes with almost every grass and

Scenes like this in Northeast vineyards are far too common. Attention to growing suitable cover crops for increasing soil supply of organic matter or for mulching should help prevent this situation.

has a large capacity for taking punishment. Surface tillage does not seem to harm it.

So far as common or Korean lespedeza is concerned, I think most are familiar with the limitations of this legume. It is definitely limited to the southern part of the region. Being an annual, it must reseed itself each fall in order to persist. The early strain of Korean called 19604 seems to be adapted further north than the common types. Most of this seed is produced in Indiana and there seems to be plenty of it.

In the southern part of the region, there are two grasses that have possibilities as ground cover which, so far as I know, have not been tried to any appreciable extent. One is Bermuda grass; the other is Zoysia. Both are southern-adapted grasses and both are growing successfully in the southern section of the Northeast region. Both are low-growing, tough, sod-forming grasses which have a large capacity for hard wear. Neither can be recommended because they have not been tested, but their potentialities are such that they deserve mention and certainly a trial in small plots. One disadvantage is that the adapted strains and species must be established with stolons (vegetatively). Good sods of Bermuda grass are growing as far north as Harrisburg. Zoysia apparently does well as far north as Connecticut and much better as one approaches Florida.

It will probably be a long time before we find a better grass than ryegrass for temporary cover. The improvement to expect probably is in the selection of a rapidly growing annual legume which, as a companion to ryegrass, will give us a more balanced sod than ryegrass alone. There have been quite a few abortive attempts at this phase of maintaining a 50-50 grass-legume cover where the sod must be destroyed annually for orchard management reasons. It may be neither feasible nor desirable so long as we are getting such good results with ryegrass alone, but we can always look forward to improvements so long as research continues to function.

All Nature is in a state of momentary equilibrium. That balance or equilibrium may be shifted one way or another by various forces. In the orchard the chief force is a gain or loss of

fertility which is within the control of the owner or operator. The chief reason for maintaining balanced sods is to maintain a supply of active organic matter which performs various well-known essential functions. All attempts to achieve this end will be futile unless the all-important factor of balanced feeding is considered and accomplished. It is not enough to consider only the plant-food needs of the trees and of the fruit crop. It is the fibrous root mass of cover crop sods which mellow the soil, keep it cool and porous, and render fertilizers available to the trees. From every practical standpoint, therefore, the balanced feeding of the sods should receive foremost attention with the emphasis placed upon feeding and managing the principal legume, for where legumes thrive, grasses and fruit trees surely will.

Orcharding from the Ground Up

(*From page* 15)

trees in an old orchard, but Anderson doesn't agree with that policy. When a tree dies he plants a new one in its place, regardless of ages of the others. However, he does fertilize the land extra heavily for these young trees. In some rows the trees are of varying height, like children in a family. He calls his system perpetual production because the orchard will always have a full complement of trees by this plan. He doesn't believe in wasting space left after a tree dies.

Each new parcel of land that he has added to his farm has gone through a period of soil reconditioning. One piece of land that he bought six years ago had several blow holes 6 to 8 feet deep. After leveling the soil, he concentrated on feeding it with fertilizer and organic matter before planting peach trees on it.

Building up the fertility and organic-matter content of the soil is good insurance against erosion, too, he believes. It also is his opinion that insects and diseases are not as troublesome on well-nourished soil as on land that is low in fertility. He admits one cause for the apparent difference may be that pests find enough food in other plants. That's one reason he won't plant young trees on fallow land. He has a cover crop to satisfy cutworms and other eating insects until the trees are well established.

Anderson is as careful about the care of his trees as about the soil that supports them. One of the first jobs of late winter is to prune to help maintain proper shape of the tree and maximum fruiting surface. Like other good orchardists, he keeps peach trees low and spreading.

His program of insect and disease control on peach trees includes 11 sprays. He keeps a watchful eye on the condition of his trees. The first sign of new trouble starts him on a campaign to find out what it is and how it can be controlled. His theories have met some opposition from orchard specialists and from companies that furnish some orchard supplies. Nevertheless, he has convinced most of them that he is a "trained experimenter."

Bob Anderson is an avid reader, in constant search for information that will make his orchard better. He likes to experiment with new ideas, too, and doesn't hesitate to tell of his mistakes as well as his successes. One mistake he made was to sprinkle a pound of borax per tree under 10 peach trees to see what effect it would have on the trees and fruit. It ruined his peach crop on these 10 trees for several years. The trouble was later corrected by using material to counteract this overdose. He now uses borax and other untried treatments in smaller quantities.

Income and Outgo

(*From page* 5)

bought my first car on the installment plan, I have burned out and bumped up more pounds of rubber, wheeling to and fro, than my own share of the imports amounts to.

In this rubber deal we see a fine demonstration of the resourcefulness of us Yanks when up against an embargo of vital raw materials, and it almost works against the modern principles of a wider international relationship. In five South American centers we have helped produce and distribute promising budwood from better strains the Hevea rubber tree to plant several thousand acres of the natural source of rubber, and last year there were 25 plants engaged in the manufacture of synthetic rubber substitutes. Great expectations have been brewing over the rubber possibilities of Russian dandelion, goldenrod, and southwestern guayule. In my own humble opinion, however, this rubber production business will in the long run continue to be a tropical venture; and, dare I whisper it out loud—the dirt-cheap labor in those zones is the thing which will keep it there most effectively.

With this same hunch for "home remedies" the chemists at the Department of Agriculture have taken the casein route to paint brushes. Probably they saw folks using casein for paint material and followed along the same path as the plastic makers, to develop a new source of bristles with which to spread the pigment. As late as 1941 we imported six million pounds of hog bristles from China, which halted when the war began. Since then the better paint brushes have been treasured articles, which has done us some good in teaching better methods of cleaning and storing them. Thus deprivation breeds conservation and checks some of the terrific waste caused by laxity and laziness. But I presume we will forget the rules of thrift as soon as fresh imports start anew. If we had some way of retaining our alertness for invention under the throes of necessity, as well as the newly acquired zeal for taking care of scarce tools, it might make this temporary isolation worth while.

When we found ourselves short of kapok and jute, sisal and hemp, the AAA and other agencies, like Defense Supplies Corporation, got busy and erected costly inland hemp centers for a new wave of fiber crop production, while hosts of fine 4-H kids were sent afield to glean and store tons of milkweed floss as a possible kapok substitute. The response was wonderful last summer, and in the usual American fashion the program was oversold and overdone. Today huge stacks of hemp line the yards near mills no longer needed, and most of the milkweed floss won't ever be used in the way it was intended—because the Navy has a new idea for flotation material. Yet don't forget that it kept men and kids on active jobs and circulated some handy money, so why complain?

METAL working trades are another line which has felt the pinch. Now some of us forget that not all the forges and furnaces and foundries are in the big Appalachian smoky zone which we see as red flares on a night-bound train. Yet scattered through many of our agricultural states are shops and plants owned by "small guys" who look to a steady flow of certain imported metallic raw materials to keep them and their employes busy, and furnish mouths for the farmers to feed.

Take chrome ore and nickel. Stainless steel which enters so largely into modern food-plant fixtures and hospital equipment needs chrome ore and nickel in abundant supply. Back in the work shop at the bench the sheet metal and machinists need keen-cutting tools. The best of these come from stocks of alloy steel, and call for tungsten, molyb-

denum, and vanadium, which mostly come to us in ocean ships.

Housewives have mourned the lack of normal supplies of aluminum cooking utensils,' and thousands of small hardware stores had empty shelves and we wondered why. Surinam in Dutch Guiana is a long ways off from Piketown, but bauxite is the stuff from that storehouse which limits our stew-pot supply.

ONE can trot out the metallic list and begin to grasp the utter dependence we have upon imported basic materials. There is fire-resistant asbestos, tantalum for electronic tubes, and for surgery, beryllium mixed with native copper to make springs, mica and quartz crystals so vital to electric engineering, kyanite for lining blast and heating furnaces, and the old stand-by of goat diet jokes —the despised tin can. We must import all these and many more equally strategic items or else our fame and fortune as a world premier manufacturing and commercial nation will go glimmering. Likewise, the ability of folks abroad to utilize such surplus commodities as we have demonstrated our capacity to produce hinges right on our maintaining a steady flow of imports.

Our customary habit of thinking always in terms of being producers and being salesmen and promoters has often led us away from the two-way angle of foreign trade. Then so many of our inland leaders, especially dairy and cash croppers, spoke loudly for home consumption and an exportable surplus but fretted themselves sick over incoming agricultural commodities. It's only recently that farmers awoke to realize that they were consumers like the rest of us, and along with this awakening has come a broader outlook on balanced international give-and-take trading.

Then I stumbled on some figures supposed to come from high official sources. These gave me another argument to show to these old stand-pat anti-importers. It will prove that the importing business is not just something to make the seacost regions prosperous and the interior poor.

On official count of imports by tonnages, 11 Canadian border districts totaled 38,925,000 tons, compared to 54,786,000 tons at 11 Atlantic coast ports, not counting a dozen other interior ports from Ohio westward on the rivers where over one million more tons were imported in 1944. If another slant is taken of the same figures, using estimated valuations instead of tonnages, here is the answer: In 1938 Atlantic ports represented 70 per cent of total values of imports with Canadian and interior ports having 13 per cent of it. In 1944 the Commerce Department indicates that Atlantic ports account for only 50 per cent of the valuation of imports while Canadian border and interior ports represent 28 per cent. Lately the import business is moving out into the area where most obstacles had been thrust in its way. I do not know if this is merely a convenient war-time situation relative to emergency manufacture of fighting equipment, but it paves the way for a trade incentive just the same. It shows us that New York and Boston and such centers of commerce on the brink of the sea are not the only ports of entry interested in keeping up a healthy stream of cargoes and cash.

Of course, I take no retainer or accept no bribe in thus appearing in the forum argufying vehemently for intake as well as outgo. I possess no such skill and economic erudition. My only idea is to make the good-neighbor scheme work in tangible ways and be potent for permanent good, instead of a showy shibboleth to use to chatter in vainglorious ways on flowery occasions.

TO make this thing work right and with the least chance of prejudice and rancor is to achieve international peace and goodwill beforehand, coupled with a lot of tough spade work on financial agreements. Much of this detail is beyond the ken of ordinary home folks with domestic problems

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uppermost, but once the proper attitude is taken relative to the terms of peace and harmony, a mandate will go to the statesmen and importers of a far different kind than we knew in the old days of isolated "security."

The world is smaller and our eyes and ears are sharper than they used to be, thanks to science. If physical science has brought us nearer our foreign neighbors in this way, then what may we expect the social sciences to perform for us in tuning us to wider world relationships?

Fertilized Corn

A MIXED fertilizer containing phosphorus and potassium when used in addition to limestone and legumes gave an increase of 13 bushels per acre in corn yield, reports H. J. Snider, assistant chief, soil experiment fields, University of Illinois College of Agriculture.

This fertilized corn contained 10.6 per cent protein in the grain compared to 9.1 per cent in the grain from the unfertilized plot. The fertilized corn also contained 50 per cent more mineral phosphorus in the grain.

These results were obtained on an experiment field located near Sparta, Randolph county, Illinois. Limestone was added in amounts sufficient to grow legumes on the light-colored sour soils. Legumes such as lespedeza and sweet clover along with other crop residues were plowed back into the soil.

Mixed fertilizer known as 0-20-20 was applied regularly around the rotation, 100 pounds for corn, 100 pounds for wheat, and 200 pounds an acre for the hay crop. This soil treatment practice proved to be very effective on this southern Illinois land, Snider stated. He pointed out that an increased content of protein and a higher percentage of phosphorus in corn grain add to its feeding quality and tend to insure better feeding results with livestock.

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Circulars

Tomatoes (General)
Asparagus (General)
Vine Crops (General)
Sweet Potatoes (General)
Fertilize Potatoes for Quality and Profits (Pacific Coast)
Fertilizing Small Fruits (Pacific Coast)
Better Corn (Midwest) and (Northeast)
Fertilize Pastures for Better Livestock (Pacific Coast)
Of Course I'm Interested (Pastures, Canada)
Meet the Family (Canada)

Reprints

T-8 A Balanced Fertilizer for Bright Tobacco
N-9 Problems of Feeding Cigarleaf Tobacco
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What Is the Matter with Your Soil?
K-4-41 The Nutrition of Muck Crops
B-1-42 Growing Ladino Clover in the Northeast
E-2-42 Fertilizing for More and Better Vegetables
S-6-42 A Comparison of Boron Deficiency Symptoms and Potato Leafhopper Injury on Alfalfa
FF-11-42 Boron in Agriculture
II-12-42 Wartime Contribution of the American Potash Industry
JJ-12-42 The Place of Boron in Growing Truck
A-1-43 The Salt That Nearly Lost a War
H-2-43 Plant Food for Peach Profits
J-2-43 Maintaining Fertility When Growing Peanuts
M-3-43 Lespedeza Is Not a Poor Land Crop
S-4-43 Plow-Sole Fertilizers Benefit Tomatoes
W-4-43 The Soil Is the Basis of Farming Business
X-5-43 Malnutrition Symptoms & Plant Tissue Tests of Vegetable Crops
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
BB-6-43 Sericea Is A Good Crop
FF-8-43 Potash for Citrus Crops in California
PP-12-43 Commercial Fertilizers for Livestock Farms
QQ-12-43 Potash in War Production
A-1-44 What's in That Fertilizer Bag?
E-2-44 Plow-Sole Fertilizers Increase the Profits
F-2-44 Where Do We Stand With Fertilizers?
G-2-44 The Use of Borax in the Legume-Livestock Program of the South
H-2-44 Efficient Fertilizers for Potato Farms
I-3-44 Doubling Production by Bettering Soils
K-3-44 Soil Tests Indicate Potash Levels
L-3-44 South Finds Clovers Excel in Profits
N-4-44 The Potash Problem in Illinois
P-4-44 Borax Sprayed on Beets Controls Black Spot
R-5-44 More About Soybean Fertilization
T-5-44 Southern Crops Show Need of Potash
U-5-44 The Use of Fertilizer in Maryland
W-6-44 Fertilizer Requirements for Permanent Pastures in Alabama
X-6-44 Soil Management for Cannery Peas
Y-6-44 Sweet Clover Responds to Potash Fertilizer
Z-6-44 Our Fertilizers Need Magnesium
AA-8-44 Florida Knows How to Fertilize Citrus
BB-8-44 Potash for War Food
CC-8-44 Soil Fertility's Effect on Asparagus
DD-8-44 Keeping Soil Fertile in the Pecan Orchard
EE-8-44 The Need for Borax on Fourteen Crops
GG-10-44 A Trash Mulch Method of Reclaiming Land with Alfalfa
II-10-44 Fertilizing Soybeans in North Carolina
JJ-11-44 Mississippi Crop and Pasture Production Program 1942-43
KK-11-44 Growing Quality in Tomatoes
MM-12-44 Blue Lupine Is a Valuable Legume
PP-12-44 Fitting Practices to Soil Conditions
QQ-12-44 Leaf Analysis—A Guide to Better Crops
A-1-45 Fertilized Corn Plants Require Well-Ventilated Soils
C-1-45 Fertilizers for Cotton and Corn Following Lespedeza
E-1-45 Bigger Yields from Fertilizers
F-2-45 Defective Strawberry Fruit Corrected by Borax
G-2-45 Some Whys and Wherefores for Air-Conditioning Soils
H-2-45 Can We Keep Cotton in N. C. Agriculture?
I-2-45 Crop Fertilization or Rotation Fertilization
J-2-45 Potash for Legume Pastures in Florida
K-2-45 Plow-Sole Fertilizing on the Average Farm
L-2-45 Fish for Health, Recreation, and Politics
M-3-45 Potassium—A Key Element
N-3-45 The Rutabaga Crop in Virginia Is Benefited by Boron
O-3-45 Using Poultry Manure for Garden Compost
P-3-45 Balanced Fertility in the Orchard
Q-3-45 Earliness Counts with Austrian Winter Peas
R-3-45 Higher Corn Yields for North Carolina
S-3-45 Alfalfa Production on the Sand Mountain of Alabama
T-4-45 Ladino Clover Makes a Record
U-4-45 New Ideas in Haymaking from New York Farmers
V-4-45 Yield and Quality of Cotton Can Be Improved by Boron
W-4-45 Fertilizing Golf Greens
X-4-45 Idle Acres in the Southeast Can Be Put to Work

THE AMERICAN POTASH INSTITUTE

1155 16TH STREET, N. W. WASHINGTON 6, D. C.

The Archbishop had preached a fine sermon on married life and its beauties. Two old Irishmen were heard coming out of church commenting on the address. " 'Tis a fine sermon his Riverence would be after giving us," said one.

"It is indade," was the quick reply, "and I wish I knew as little about the matter as he does."

We have it that this year's bathing suits are barely big enough to keep a girl from being tanned where she ought to be.

The experienced old copyreader on the newspaper couldn't believe the reporter's story on the theft of 2,025 pigs.

"That's a lot of pigs," he growled, and called the farmer to check the copy.

"Was it 2,025 pigs that were stolen?" he asked.

"Yeth," came the farmer's lisping reply.

"Thanks," said the copyreader and corrected the copy to "two sows and 25 pigs.

A soldier in the Pacific summed up his plight in the following terse statement: "Long time no she."

A man went to the bar and ordered a Martini, drank it, chewed up the bowl of the glass, and threw the stem over his shoulder. He continued this for about six martinis, when he noticed the bartender was staring at him.

"I guess you think I'm crazy, don't you?" he asked.

"I sure do," the bartender replied. "The stems are the best part."

At a railroad station recently, an MP kept shouting: "Call your destinations when you come through!" Sailors, soldiers, and Marines streamed through the gate, each calling out the place he was headed for, until the MP halted one Marine abruptly who'd tried to pass through without an announcement.

"Hey you, sound off!" yelled the MP. "What's your destination?"

The Marine gave the MP one scorching look, then shouted back, "Where in the hell do you think? Tokyo!" and dashed by.

Asked why he was going to marry a glamour girl from the city instead of some woman his own age, Grandpappy opined: "I'd a heap ruther smell perfume than liniment!"

"Papa, I have to bring to the class tomorrow a simple explanation of 'inflation' and also of the Einstein theory of relativity. I wish you would help me."

"All right, son. Suppose we begin with Einstein's theory. That's the easiest."

Sailor (at stage door): "Is the hula dancer in her dressing room?"

Watchman: "Son, she's 'round at the rear."

Sailor: "Answer my question."

Minister (on golf course): "I notice that the players who get the lowest scores are not those who swear."

Fellow Golfer (as he dug another slice of turf): "What the hell have they got to swear about?"

Need for—

BORON IN AGRICULTURE

Authorities have recognized that the depletion of Boron in soil has been reflected in limited production and poor quality of numerous field and fruit crops.

Outstanding results have been obtained with the application of Borax in specific quantities or as part of the regular fertilizer mix, improving the quality and increasing the production of alfalfa and other legumes, table beets, sugar beets, apples, etc.

The work of the State Agricultural Stations and recommendations of the County Agents are steadily increasing the recognition of the need for Boron in agriculture. We are prepared to render every practical assistance.

Borax is economical and very little is required. It is conveniently packed in 100 lb. sacks and stocks are available for prompt delivery everywhere in the United States and Canada. Address your inquiries to the nearest office.

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BORAX

for agriculture

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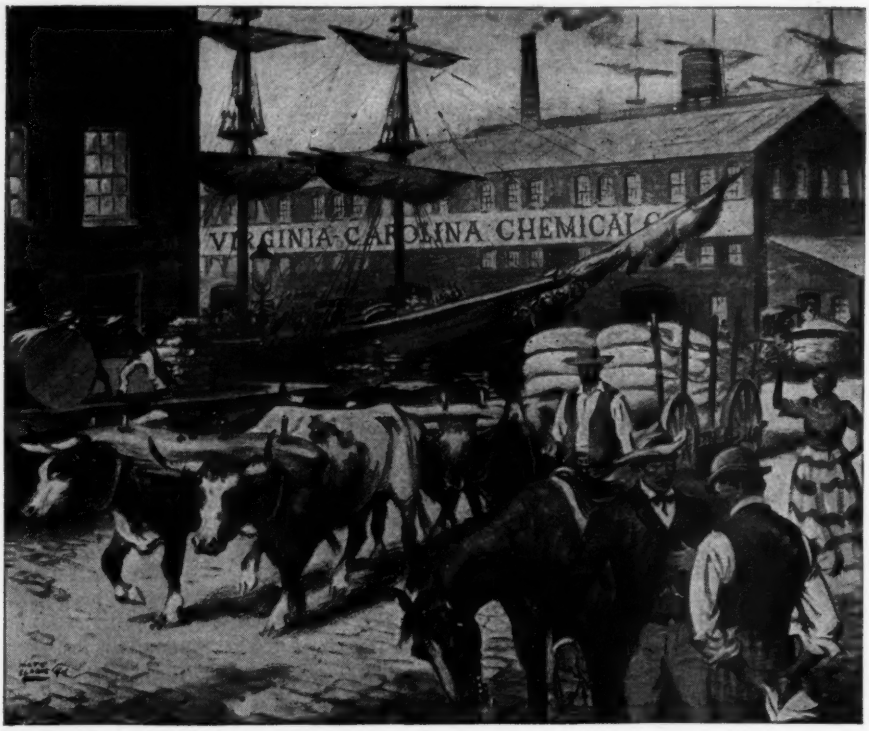

THE BIRTH OF A NEW IDEA

THE FIRST V-C Fertilizers were delivered to the farm in 1895. These fertilizers were the beginning of a new idea in the manufacture and distribution of commercial plant-food. For economy and convenience, V-C factories were to be located near the farms they served and yet each factory was to benefit from the scientific research, experience, skill and facilities of a national organization.

Today, through its network of 34 fertilizer factories, its phosphate rock mines, its 20 sulphuric acid plants, its 26 superphosphate producing units, its chemicals division and its analytical and research laboratories, the V-C organization serves farmers in every state from the Rocky Mountains to the Atlantic and from Canada to the Gulf of Mexico.

Today more V-C customers are using more V-C Fertilizers than ever before in history . . . their total crop production is greater than ever before in history . . . and their cash farm income is higher than ever before in history.

It is fitting and proper that V-C's 50TH ANNIVERSARY should find V-C Fertilizers rendering their greatest service to the American farmer.

VIRGINIA-CAROLINA CHEMICAL CORPORATION

Richmond, Va. • Norfolk, Va. • Greensboro, N.C. • Wilmington, N.C.
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VC FERTILIZERS

Protecting Seed from Soil-borne and Seed-surface Fungi

County agents were quick to recognize the importance of protecting seed against fungi that cause decay, with a resulting decrease in stands and yields. Practically all soils contain such destructive fungi.

Among the chemicals that have proved most effective in reducing seed decay is Spergon. Booklets are now available reporting on tests with Spergon on the following crops:

PEAS
LIMA BEANS
SWEET CORN
FIELD CORN
SORGHUM
PEANUTS
SOYBEANS

Send for your complimentary copies of these reports now. You will find them helpful.

TYPICAL DOSAGES

Corn	1½ oz. per bu. seed
Peas	2 oz. per bu. seed
Beans (including Limas)	2 oz. per bu. seed
Soybeans	2 oz. per bu. seed
Sorghum	1½ oz. per bu. seed
Flax	2 oz. per bu. seed
Peanuts	3 oz. per 100 lbs. seed

ADVANTAGES OF SPERGON

- Safe to use—cannot harm delicate seeds, even when used in excess.
- Safe for user—non-injurious, non-irritating, to those applying it to seed.
- Long lasting—Spergon does not deteriorate with age; may be applied months in advance of planting.
- Self-lubricating. No graphite needed in drill.
- Compatible with legume inoculants.

Spergon

Reg. U.S. Pat. Off.

SEED PROTECTANT

UNITED STATES RUBBER COMPANY

Naugatuck Chemical Division

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Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony Program. CBS network, Sunday afternoon, 3:00 to 4:30 E.W.T.

Serving Through Science

THE PLANT SPEAKS

A new four-reel series of 16 mm., sound, color films which may be booked independently or in any combination. They may be used to best advantage when shown at least one day apart and in the following sequence:

THE PLANT SPEAKS THRU DEFICIENCY SYMPTOMS pictures soil depletion, erosion, and deficiency symptoms on plants. (Running time 25 min. on 800-ft. reel.)

THE PLANT SPEAKS, SOIL TESTS TELL US WHY depicts taking soil samples on the farm and the interpretation of soil tests. (Running time 10 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

Potash in Southern Agriculture (South)
In the Clover (Northeast)
Bringing Citrus Quality to Market (West)
Machine Placement of Fertilizer (West)
Ladino Clover Pastures (West)
Potash from Soil to Plant (West)
Potash Deficiency in Grapes and Prunes (West)
New Soils from Old (Midwest)
Potash Production in America (All)
Save That Soil (All)

IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

American Potash Institute
1155 Sixteenth Street
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